PROCEEDINGS Edited by Prof.Dr. Hüseyin Gökçekuş

VOLUME 4



International Conference on 19-24 February 2007 Nicosia-Turkish Republic of Northern Cyprus Environment: Survival and Sustainability Organized by NEAR EAST UNIVERSITY Published By: EDUCATIONAL FOUNDATION OF NEAR EAST UNIVERSITY Near East University, Lefkoşa, Turkish Republic of Northern Cyprus Tel: +90 392 223 64 64 Fax: +90 392 223 64 61 e-mail: info@neu.edu.tr web: www.neu.edu.tr

Citation: Gökçekuş, H., 2009 (Editor) Proceedings of the International Conference on Environment: Survival and Sustainability. Nicosia (Lefkoşa), Turkish Republic of Northern Cyprus: Educational Foundation of Near East University. 10 volumes, LXXVI, 5498, XIV pages.

- **Copyright:** Reproduction of this Publication for Educational or other non-commercial purposes is authorized without prior permission from the copyright holder. Reproduction for resale or other commercial purposes prohibited without prior written permission of the copyright holder.
- **ISBN:** Volume 4: 978-975-8359-56-1
- **Disclaimer:** While every effort has been made to ensure the accuracy of the information contained in this publication, the EDUCATIONAL FOUNDATION of the NEAR EAST UNIVERSITY will not assume liability for any use made of the proceedings and the presentation of the participating organisations concerning the legal status of any country, territory, or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.
- Printed by: Near East University Tel: +90 392 223 64 64 Fax: +90 392 223 64 61



Editor: Prof. Dr. Hüseyin GÖKÇEKUŞ Near East University Lefkoşa, Turkish Republic of Northern Cyprus <u>ghuseyin@neu.edu.tr</u>, <u>gokcekushuseyin@gmail.com</u> Tel/Fax: 00 90 392 223 54 27

Members of the Editorial Board:

| Anwar NASIM | Pakistan |
|-----------------------|------------|
| Aysel YONTAR | TRNC |
| Cyro Do VALLE | Brasil |
| Derin ORHON | Turkey |
| Elchin KHALILOV | Azerbaijan |
| Giovanni BARROCU | Italy |
| Gunnar TELLNES | Norway |
| Jim LAMEROX | USA |
| Konstantin V. SUDAKOV | Russia |
| Luc HENS | Belgium |
| Münür ÖZTÜRK | Turkey |
| Reinhold STEINACKER | Austria |
| Tarzan LEGOVIC | Crotia |
| Ulric ROTT | Germany |
| Umut TÜRKER | TRNC |
| Ümit HASSAN | TRNC |
| Vedat DOYURAN | Turkey |
| Walter KOFLER | Austria |
| Zekai ŞEN | Turkey |





CONTENTS

| Editor/Members of the Editorial Board III |
|--|
| PrefaceVII |
| AcknowledgmentsVIII |
| Organizing Committee Members IX |
| International Advisory Board MembersX |
| Scientific Committee Members XIII |
| Messages |
| Opening Speeches XIX |
| Prof. Dr. Ümit Hassan, Rector of Near East University, TRNC Prof.Dr. Hüseyin Gökçekuş, President of the Conference & Organizing Committee, TRNC Rahmi Koç, Honorary Chairman & Founding Member of TURMEPA, TURKEY Eşref Cerrahoğlu, Chairman of Executive Board of TURMEPA, TURKEY Cemal Bulutoğluları, Mayor, Turkish Municipality of Lefkoşa, TRNC Asım Vehbi, Minister of Environment and Natural Resources, TRNC Tahsin Ertuğruloğlu, Leader of the National Unity Party(UBP), TRNC Assoc. Prof.Dr. Turgay Avcı, Deputy Prime Minister & Minister of Foreign Affairs of TRNC Türkekul Kurttekin, Turkish Ambassador to Lefkoşa, TRNC |
| Prof. Dr. Ekmeleddin İhsanoğlu, OIC Secretary General Mehmet Ali Talat, President of TRNC |

| - | | |
|---------------|---|-------|
| Sustainabilit | y | XXXIX |



| List of Papers and Posters | XLIII |
|--|--------------------------------------|
| Papers and Posters | |
| Volume 1: MT-1: Business and Environment : Redefining Interests | 1 |
| Volume 2: MT-2: Conservation and Management of Biodiversity | 187 |
| Volume 3: MT-3: Cultural Heritage and Environmental Factors | |
| Volume 4: MT-4: Economics, Development and Sustainability | 1043 |
| Volume 5: MT-5: Energy and Development: New and Renewable Energy MT-6: Environment and Health | 1673 1953 |
| Volume 6: MT-7: Environmental Awareness, Education, and Lifelong Learning MT-8: Environmental Knowledge and Information Systems MT-9: Environmental Law and Ethics MT-10: Environmental Organizations: Roles, Problems and Prospects | 2369 2615 2807 2895 |
| Volume 7: MT-11: Environmental Science and Technology MT-12:Global Warming: How Much of A Threat? | 2923 3607 |
| Volume 8: MT 13 -Green Factor In Politics MT-14: Integrated Water Resources Management | 3785 3847 |
| Volume 9: MT-15: International Relations and Environmental Issues MT-16: Literature and Environmental Awareness MT-17: Natural and Man-Made Disasters: Emerging Link and Challenges MT-18: Pesticides In The Environment and Food Commodities MT-19: The Role of Media : Problems and Challenges | 4367 4527 4587 4741 4809 |
| Volume 10: MT-20: Seas, Ecological Balance, and Sustainable Environment MT-21: Social and Psychological Dimensions of Environmental Issues | 4915 5117 |
| Index | I |
| Brief Information About Near East University | XI |
| Brief Information About Turkish Republic of Northern Cyprus | XV |





PREFACE

Creating a sustainable and a healthy environment is one of the most important global issues facing mankind today. Therefore, serious consideration should be given to environmental problems and concerted efforts should be made worldwide in order to respond and prevent present and future environmental risks and challenges.

The International Conference on Environment: Survival and Sustainability (ESS 2007) organized by the Near East University between the dates 19 and 24 February 2007 was held in Lefkosa, Turkish Republic of Northern Cyprus. The main objective of this multidisciplinary conference was to gather scientists from all over the world to discuss the overall issue of the environment, to find out sustainable solutions for environmental problems and to identify areas for future collaboration in this matter. The conference brought together 2,052 participants from 108 different countries. During the conference a total of 1,463 papers were presented under 21 different subtopics, representing various scientific disciplines. The topics included environmental law and ethics, environmental knowledge, technology and information systems, media, environmental awareness, education and lifelong learning, the use of literature for environmental awareness and the effects of the green factor in politics and in international relations.

The Scientific Committee of International Conference ESS2007 evaluated all of the 1,463 papers and selected among them 610 papers to be included in The Proceedings of Environment: Survival and Sustainability. The readers will notice the wide range of topics represented by the papers included in the Conference Proceedings.

It is hoped that this book will serve to contribute to increase in awareness towards various environmental issues as well as drawing more attention to the urgency of international cooperation and collaboration in pursuing sustainable environmental management.

Prof. Dr. Hüseyin Gökçekuş President of the Conference and the Organizing Committee Vice Rector of the Near East University Lefkoşa-TRNC 18 February 2009



ACKNOWLEDGMENTS

The Organizing Committee of the ESS2007 Conference would like to extend its sincere appreciation to Dr. Suat Günsel, the Founding Rector of the Near East University, to Prof. Dr. Ekmeleddin İhsanoğlu, General Secretary of the Organization of Islamic Conference and to Prof. Dr. Walter W. Kofler, President of ICSD/IAS for their significant support and encouragement in the conference.

Appreciation is also extended to the chairpersons, the keynote speakers and the presenters of papers in the conference.

We are deeply grateful for the members of the editorial board who have carefully read and recommended the papers for publishing.

We also wish to express our gratitude to numerous individuals for their valuable contribution to the editing process.

Prof. Dr. Hüseyin Gökçekuş President of the Conference and the Organizing Committee Vice Rector of the Near East University Lefkoşa-TRNC



ORGANIZING COMMITTEE MEMBERS

Honorary President

Dr. Suat İ. GÜNSEL, Founding Rector of the Near East University

President

Prof. Dr. Hüseyin GÖKÇEKUŞ, Vice Rector of the Near East University

Members

Prof. Dr. Ümit HASSAN, Rector of the Near East University Prof. Dr. Aysel YONTAR Dr. Hatice GÖKÇEKUŞ (M.D.) Asst. Prof. Dr. Umut TÜRKER Asst. Prof. Dr. Mesut YALVAÇ Asst. Prof. Dr. Rifat REŞATOĞLU Asst. Prof. Dr. Mehmet OKCAN Asst. Prof. Dr. Dudu ÖZKUM Asst. Prof. Dr. Salih GÜCEL İrfan GÜNSEL Gürdal HÜDAOĞLU Havva ARSLANGAZİ Tümer GARİP Alp ÖZERK Ahmet SAVAŞAN Nesrin MENEMENCİ Şakir ALEMDAR Zehra BAŞARAN Temel RIZZA Emel TOZLU ASLAN Şifa ABİK



INTERNATIONAL ADVISORY BOARD MEMBERS

| A. I., OLAYINKA | Nigeria |
|--------------------------------------|-------------|
| A., JAGADEESH | India |
| Abdul, KHAKEE | Germany |
| Abdullahi Elmi, MOHAMED | Somalia |
| Agustin Gonzales Fontes de, ALBORNOZ | Spain |
| Ajmal, KHAN | Pakistan |
| Aleh, RODZKIN | Belarus |
| Alex, CHENG | USA |
| Ayman Abou, HADID | Egypt |
| Ayşe, DÖNMEZER | Turkey |
| Aziz, ERTUNÇ | Turkey |
| Belay, TEGENE | Ethiopya |
| Çağatay, GÜLER | Turkey |
| Dana, KOLEVSKA | Macedonia |
| Ed, BOLES | Belize |
| Elizabeth, GONZALEZ | Uruguay |
| Elizabeth, THOMAS-HOPE | Jamaica |
| Ersi, ABACI KALFOĞLU | Turkey |
| Filiz, DILEK | Turkey |
| Furkat, KHASSANOV | Uzbekistan |
| Gaudelia A., REYES | Philippines |
| George, CONSTANTINOU | Cyprus |
| George, PETRIDES | Cyprus |
| Günay, KOCASOY | Turkey |
| Guntis, BRUMELIS | Latvia |
| Halime, PAKSOY | Turkey |
| Hallvard, ÓDEGAARD | Norway |



| Hasan, ERTEN | Turkey |
|----------------------------------|------------|
| Hunay, EVLIYA | Turkey |
| Ibrahim Abdel Gelil Said, ABDULA | Bahrain |
| İbrahim S., ALNAIMI | Qatar |
| İrfan, GÜNEY | Turkey |
| Jaco, VANGRONSVELD | Belgium |
| Joe, LEWIS | Namibia |
| John, SAKA | Malawi |
| Lyoussi, BADIAA | Morocco |
| M. Nasir, SHAMSUDIN | Malaysia |
| Mahmut Parlak, TUNA | Turkey |
| Mannar, FAYYAD | Jordan |
| Manuel Benito, CRESPO | Spain |
| Marcel, STIVE | Netherland |
| Margaret, ZIMBA | Zimbabwe |
| Mark, BYNOE | Guyana |
| Mohsen, HOSSEINI | Iran |
| Moneef R., ZOU'BI | Jordan |
| Mutasem, EL-FADEL | Lebanon |
| Neşet, KILINÇER | Turkey |
| Nükhet, TURGUT | Turkey |
| Orhan, ALTAN | Turkey |
| Peyman, YALÇIN | Turkey |
| Qasem Abdul, JABER | Palestine |
| Ramzi, SANSUR | Palestine |
| Reinhold, STEINACKER | Austria |
| Renee, RICHER | Armenia |
| Richard, MOLES | Ireland |
| Şafak, URAL | Turkey |
| Selim, KAPUR | Turkey |



| Serpil, OPPERMAN | Turkey |
|--------------------------|---------|
| Seval, SÖZEN | Turkey |
| Sevgi, SARYAL | Turkey |
| Skender, OSMANI | Albania |
| Songül A., VAIZOĞLU | Turkey |
| Tarzan, LEGOVIC | Croitia |
| Tetsuo, YUHARA | Japan |
| Tuluhan, YILMAZ | Turkey |
| Turan, ÖZTURAN | Turkey |
| Ümit, ERDEM | Turkey |
| Valentina, YANKO-HOMBACH | Canada |
| Waleed Khalil, ZUBARI | Bahrain |
| Yigal, RONEN | Israel |
| Zekai, ŞEN | Turkey |
| Zohra Ben, LAKHDAR | Tunisia |



SCIENTIFIC COMMITTEE MEMBERS

Ferid, MURAD - Nobel LaureateRichard R., ERNST - Nobel LaureateYuan T., LEE - Nobel Laureate

USA

Switzerland Taiwan

| A.H., ZAKRI | Malaysia | |
|-------------------------|-----------------------|--|
| Ahmad, MARRAKCHI | Tunisia | |
| Alexey Arkady, VOINOV | USA | |
| Andrea E., RIZZOLI | Switzerland | |
| Andrew, BROOKES | Australia | |
| Anne, BUTTIMER | Ireland | |
| Anthony J., JAKEMAN | Australia | |
| Anwar, NASIM | Pakistan | |
| Barry W., WILSON | USA | |
| Bjarne Bruun, JENSEN | Denmark | |
| Branimir, JOVANCICEVIC | Serbia and Montenegro | |
| Charles N., ALPERS | USA | |
| Dan C.C., GALERIU | Romania | |
| David A., STAH | USA | |
| Derin, ORHON | Turkey | |
| Elchin, KHALILOV | Azerbaijan | |
| Eric, JOHNSON | Switzerland | |
| Esteban G., JOBBAGY | Argentina | |
| Fabian M., JAKSIC | Chile | |
| Farhat M., ALI | Pakistan | |
| Frederick.I.B., KAYANJA | Uganda | |
| Gabriele, VOIGT | Austria | |
| Galip, AKAY | UK | |
| G-C., FANG | Taiwan | |



| Geoff, BERTRAM |
|----------------------|
| George G., LUNT |
| Gerald, LALOR |
| Germano, MWABU |
| Giovanni, BARROCU |
| Girja K., SHUKLA |
| Gopal B., THAPA |
| Hanwant B., SINGH |
| Hartmut, FRANK |
| Heila, LOTZ-SISITKA |
| Helen, SCHNEIDER |
| Hillel S., KOREN |
| Hiromi, YAMASHITA |
| Holmes, ROLSTON |
| Hruska, JAKUB |
| Irena, TWARDOWSKA |
| Isfaq, AHMAD |
| J.F.Santos, OLIVEIRA |
| James, DEVILLERS |
| Jaroslav, BOHAC |
| Jennifer, BROWN |
| Jianping, WU |
| Jim C., BRIDEN |
| John, DAISH |
| John, GREGORY |
| John, HOSKINS |
| Judith T., ZELIKOFF |
| Jyrki, LIESIVUORI |
| Kaku, NOKOE |
| Kenneth N., TIMMIS |

New Zealand UK Jamaica Kenya Italy India Thailand USA Germany South Africa South Africa USA UK USA Chezch Republic Poland Pakistan Portugal France **Chezch Republic** New Zealand China UK New Zealand UK U.K USA Finland Ghana Germany



| Kristine, WALRAEVENS | Belgium |
|-------------------------|------------|
| Kyaw Tha, PAW U | USA |
| Kyoung-Woong, KIM | Korea |
| Luc, HENS | Belgium |
| M. Shamsher, ALI | Bangladesh |
| Mamdouh, NOUH | UAE |
| Manzoor, QADIR | Syria |
| Marcel, ARNOULD | France |
| Marcial, BLONDET | Peru |
| Martha C., MONROE | USA |
| Mary, SEELY | Namibia |
| Mehmet, ERGIN | Turkey |
| Michael, WILHELM | Germany |
| Münür, ÖZTÜRK | Turkey |
| Muthana, SHANSHAL | Iraq |
| Naim H., AFGAN | Portugal |
| Nicholas, MASCIE-TAYLOR | UK |
| Nicholas, ORNSTON | USA |
| Norhayati Mohd, TAHIR | Malaysia |
| Pall, HERSTEINSSON | Iceland |
| Patricia, MAURICE | UK |
| Paul W., JOWITT | UK |
| Paulo B., LOURENCO | Portugal |
| Peter, BRIMBLECOMBE | UK |
| Peter, KRUMBIEGEL | Germany |
| Peter, NOVAK | Slovenia |
| Philip E., LAMOREAUX | USA |
| Philip M., FEARNSIDE | Brazil |
| Ravi, JAIN | Australia |
| Richard, ROBINS | France |



| Robert J., LETCHER | Canada |
|-----------------------|--------------|
| Robert, GIFFORD | Canada |
| Roberto, DANOVARO | Italy |
| Saffa B., RIFFAT | UK |
| Sam, KACEW | Canada |
| Sandor, KEREKES | Hungary |
| Scott, SLOVIC | USA |
| Sevket, DURUCAN | UK |
| Shafiqul I., BHUIYAN | Bangladesh |
| Shahamat U., KHAN | USA |
| Shian-chee, WU | Taiwan |
| Siaka, SIDIBE | Mali |
| Stephen P., MCCARTHY | USA |
| Tarzan, LEGOVIC | Croatia |
| Tomasz, ZYLICZ | Poland |
| Ulric, ROTT | Germany |
| Vedat, DOYURAN | Turkey |
| Victor G., PRIETO | USA |
| Walid A., ABDERRAHMAN | Saudi Arabia |
| Walter, KOFLER | Austria |
| William.J., MANNING | USA |
| Wiranto, ARISMUNANDAR | Indonesia |
| Zhihong, XU | Australia |



C* C*

International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

Message from the Honorary President of the Conference

The interaction between humans and their environment has entered a critical stage as the delicate balance between them has become more fragile making it difficult for the nature in many areas to renew itself. All this poses a variety of serious challenges for us all. The main challenge before us is no less than redefining our entire relationship with our environment. At this critical juncture, I feel excited and take pride in once again hosting such a distinguished group of scientists, researchers, journalists, and students from all over the world at our university addressing such a critical global concern. I look forward to welcoming you all in Turkish Republic of Northern Cyprus.

Yours truly, Dr. Suat İ. Günsel Founding Rector of the Near East University

Message from President of the Conference

It gives me the utmost pleasure in welcoming you all to the International Conference " Environment: Survival and Sustainability" here at the Near East University in Turkish Republic of Northern Cyprus to be held at 19-24 February 2007.

The conference aimed at bringing together more than 2,000 scholars and researchers from over 90 countries around the world to discuss environmental issues from a variety of perspectives; underline the importance of the need for urgency in taking steps by the international organizations, states, local authorities and non-governmental organizations to move to a sustainable environment/development model; and thereby makes its contribution to worldwide debate effort on strengthening the bridge between theory and practice in meeting environmental threats/challenges.

Since our last international conference on environment, "Environmental Problems of the Mediterranean Regions", worldwide environmental disasters as well as local ones have multiplied and environmental degradation and pollution has continued. While major strides have been made in the world in analyzing, understanding and informing the public about the environmental challenges we are facing, we still have a long way to go. Our way of life is still far from a sustainable model and our environment continues to degrade and deteriorate due to human activities. The consequences can be seen in worldwide environmental disasters as well as locally in our daily lives.

This is going to be our third international conference on Environment organized by our young university since it was established in 1988.

Yours sincerely, Prof. Dr. Hüseyin Gökçekuş Vice Rector of the Near East University





OPENING SPEECHES

Prof. Dr. Ümit HASSAN Rector of Near East University, TRNC

His Excellency, the Prime Minister of the Turkish Republic of Northern Cyprus,

His Excellency Secretary General Organization of the Islamic Conference,

Distinguished guests, colleagues, ladies and gentlemen,

On behalf of the Founding Rector and the Near East University, I take this opportunity to wish you all a warm welcome for a fruitful conference. It is a great pleasure for me to be a participant at this international conference.

The International Conference on Environment, Survival and Sustainability is a new and most important sequel to a chain of international conferences organized by the Near East University. I trust the conference will provide participants with an opportunity to discuss, to show and to express the related problems and share their experiences. I believe that we will have a most beneficial scientific medium taking the battles into consideration between theoretical analysis and experimental observations and studies.

It is evident that this balance of methods and techniques will have to create a high level of scientific contribution. In other words, the conference will strengthen the bridge between theory and practice in meeting environmental threats, and emphasize the urgent need for coordination and integration among all bodies towards a more sustainable environment. I would like to take this opportunity to proudly emphasize and announce the accomplishments of the Near East University in fulfilling the requirements in founding the School of Medicine as a subsequent step following the School of Pharmacology and the School of Dentistry which will start to function properly in this coming academic year. Within this context, I would like to inform you that the technological means and the academic staff needed by such schools are at the highest level at the Near East University. Our conception of the Technopark being different from the practices of other universities is solely aimed at using our efforts and resources in developing the necessary infrastructure for establishing a Medical School which will be in the service of the island. From a social-psychological perspective, I believe this will enhance the perception of people regarding the dimensions on the management of health issues of the islanders, and for us this would be a moral boost. Considering the significant intellectual and moral capacity of the participants, I simply think that we all want to declare that each and every soul on this planet has the right for survival and to be included amongst the fittest.

Thank you, thank you all.



Prof. Dr. Hüseyin GÖKÇEKUŞ President of the Conference & Organizing Committee Vice Rector of Near East University

Your Excellency, President of the Turkish Republic of Northern Cyprus, Your Excellencies, Distinguished Scientists and Participants, Ladies and Gentlemen, Members of the World Press

On behalf of the NEU, I would like to welcome you all to the "Environment: Survival and Sustainability" Conference organized by Near East University in LEFKOŞA.

Today, it has been understood that environmental problems with their cumulative characteristics are closely interrelated with many economic, social, cultural, political and administrative parameters, which are naturally interrelated with academic insight.

Near East University was established in 1988 and has since then grown to become one of the fastest developing universities in the region setting itself the strategic goal of joining the "top 500 universities in the world."

Near East University is a member of the European University Association, the International Association of Universities and the Federation of the Universities of the Islamic World. The University has over 3,000 staff, of which 900 are academic personnel. 17,000 students from 44 different countries are attending 12 faculties and 50 departments at the university. There are 14 dormitories with a capacity of 4,000; and several new dormitories are under construction. Nearly 50% of the students receive scholarships. This figure includes full scholarships, partial support given to students who are in need of financial help, and to those students with sportive accomplishments.

The University has to date organized 12 international conferences and congresses and many local and regional conferences, seminars and panel discussions on a variety of subjects.

The Near East University is honored to host this world conference which has surpassed in scope and content the conferences it has organized before.

Around 2,000 participants from more than 100 countries in the world are present here to discuss environmental issues from a variety of perspectives.



Turning back to the cumulative characteristic of the environmental problems, it is clear that ecological deterioration is the most important problem resulting from regional conflicts, demographic outburst, consumption of natural resources, starvation, degradation of the environment, dwindling fresh water supplies, natural mega-disasters like typhoons, earthquakes, and landslides. Hunger and malnutrition are a direct result of a lack of access to/or exclusion from productive resources, such as land, the forests, the seas, water and technology. As such, this problem is gradually gaining weight in international and national environmental politics, because all these are threatening the common future of humanity. This has refocused the world's attention on the urgency of researches and practical steps on environmental issues. These issues require global solutions in accordance with their global characteristics.

In the EU programme called "*Environment 2000: Our Future, Our Choice*" 4 major topics have been selected as priority targets. Climate Change Biological Diversity Environment and Health Management of Natural Resources and Waste Sustainable development is the solution that leads towards a strategy that will consider the environmental problems for future generations.

Most important guidelines for Sustainable Development are:

- -Demographic control.
- -Reforestation.
- -Protection of agricultural areas.
- -Energy saving.
- -Development of renewable energy sources.
- -Improvement in the implementation of existing legislation.
- -Integrating environmental concerns into other policies.
- -Working in cooperation with the business.
- -Educating people to change their unfriendly behaviors towards the environment.

-Environmental accounting in land-use planning and management decisions.

Global Environmental strategy is a must.

ENVIRONMENT DOES NOT UNDERSTAND POLITICS. IT HAS NO BOUNDARIES OR BORDERS.

The main message of our Conference will contribute to the worldwide debate and create a multidisciplinary discussion forum where experts from various disciplines will be able to discuss environmental issues in 21 fields such as culture, biodiversity, health, education, business and economy, environmental technology, climate change and energy among others.



Dear Guests,

Environment: Survival and Sustainability Conference is going to give you all an opportunity to get to know Near East University. The Grand Library collection has reached to more than 500,000 while 52 million articles are accessible through electronic databases. The Grand Library is fully computerized and linked to many major world libraries and research institutions throughout the world. It is open 24 hours a day, serving not only the university but the whole community. In other words the Grand Library functions as a national library.

It is my pleasure to extend our gratitude to the members of the Scientific Committee and the International Advisory Board whose active role raised the scientific level of this conference and also increased the number of participants. Unfortunately, some of the Scientific Committee members withdrew due to non scientific letters they received.

In my opinion, as pointed above

SCIENCE HAS NO BORDERS and NO BOUNDARIES. IT IS OF THE HUMANS and FOR THE HUMANS.

Coming to our SLOGAN: RIO 1992 Johannesburg 2002 Nicosia 2007 **We do not have much time to lose.**

On behalf of the Organizing Committee, I would like to extend our special and sincere thanks to our Founding Rector Dr. Suat Günsel, whose basic aim is to provide generous support for the improvement of continental lifestyle capabilities of the island.

We extend our gratitude to Islamic Development Bank and to the Secretary General of Islamic Conference Organization, Prof. Ekmeleddin İhsanoğlu for their invaluable contributions.

I would like to convey our thanks to the government of Turkish Republic of Northern Cyprus for their support.

Our special thanks go to the Organizing Committee Members and the students who worked day and night for the success of this conference.

Last but not least, we would also like to extend our gratitude to H.E. Mr. Ban KI-MOON Secretary General of the United Nations, for his kind moral support.

I believe this conference will scientifically contribute to the solutions of environmental problems, and hope you will enjoy your stay in our beautiful country.



Rahmi KOÇ Honorary Chairman & Founding Member of TURMEPA, TURKEY

Mr. President, Mr. Prime Minister, Your Excellencies, distinguished guests, Ladies and Gentlemen

I would like to express my gratitude to Mrs. Sidika Atalay for inviting us here for this very important international conference today. As founder of TURMEPA, The Turkish Marine Environmental Protection Association, I would like to share my views with you regarding our activities and accomplishments in Turkey. Why and how did I found TURMEPA? You can call it luck, you can call it coincidence. I was the Chairman of the Turkish-Greek Business Council for six years. During this period, every effort that I made to get the two countries' businessmen to cooperate failed. The Greeks never said no, but they never got their act together either. Again on one occasion in Athens, though I had great enthusiasm to continue to join forces for an interesting project, unfortunately I was very disappointed by their lack of response. At the end of the meeting just before we had lunch, the late shipping Tycoon, George Livanos, who was sitting at the very back of the conference room, called me and said, "Look here, I've been following you and your efforts for sometime and see that you are not getting anywhere and are becoming frustrated. If you really want the Greeks and Turks to cooperate in one area, that will be the environment." He also said, "I founded HELMEPA, Hellenic Marine Environmental Turkish Association, called TURMEPA and let them two cooperate to keep our seas clean. So in 1994, 24 friends believed in the cause and we founded TURMEPA, the first NGO specifically dedicated to keeping the seas clean. At that time, HELMEPA was already eleven years ahead of us and the World Bank had been gathering data on Turkish seas and marine life from HELMEPA. Soon, I found out that this was a long term project and would at least need one generation's commitment. During our efforts, we learned that there are four very important points. Point number one: It's more economical to keep our waters clean than to clean them after polluting them, this was very important. The second important point: the subject is a major undertaking and cannot be done by one association alone and requires a nationwide awareness of the problem. Our third finding was that it needed education; education is most important in achieving our goal. The last important point was international collaboration that is a must as the environment does not have borders, does not have barriers, religion, race or different languages and no politics are involved. With these four points in mind, we first trained teachers in primary schools in coastal areas and then distributed hundreds and thousands of books to these students and pupils. We also held a drawing competition with the subjects of clean seas, we made films for television and cinemas, we used newspaper advertising to get our messages across, and we worked with several universities to test water quality. In the 30 years, from 1960 to 1990 the number of species in the Marmara Sea, believe it or not, came down from 148 to only 14. Now they are coming back. We have started to see dolphins in the Bosphorus and this is good news because when dolphins come, other marine life generates itself. We set up a data room to collect and store information about marine life, our seas, inland waters and currents.



We learned to our surprise again that only 10% of sea pollution comes actually from shipping. The risk comes from domestic and industrial waste; therefore, we set up a system to monitor waste being dumped in our seas. Clean seas are of most importance to tourism which is a major source of revenue for our economy. Therefore to this end, we collaborated with sea side hotels, holiday villages, restaurants and cafes to ensure their compliments with environmental regulations. We then hoisted our TURMEPA flag on their premises. When they did so in the summer months, we put together a team of students to collect garbage from boats and yachts free of charge, we set up garbage containers in coastal areas where garbage can be deposited by banks, businesses, industries and then collected by municipal authorities. Our financing is usually organized on a project basis. With all this said and done, Ladies and Gentlemen, our efforts are still only a drop in the ocean if awareness is not felt by our citizens. Therefore, we are constantly telling the public at large that we have ignited a spark, which we must still help to spread throughout the country.

I am happy to say that the Turkish government and its Ministers, especially the Ministry of Transportation, our Governors, Mayors, academicians and businessmen have realized that clean seas are one of the most important issues we are facing. Clean seas mean life and oxygen. Polluted seas not only kill marine life but also tourism and give third world nation appearance.

I am delighted that I am joined today by our Chairman Eşref Cerrahoğlu, who is himself a ship owner and our Board Member Mr. İbrahim Yazıcı who is himself a sailor, and our General Secretary Levent Ballar who never stops coming up with a new project.

Before I finish, I would like to ask our Chairman, who made contacts yesterday, to give good news to our Cypriot friends.

Thank you for bearing with me.



Eşref CERRAHOĞLU Chairman of Executive Board of TURMEPA, TURKEY

Mr. President, Mr. Prime Minister, Ladies and Gentlemen,

My Honorary Chairman addressed TURMEPA's activities. I am very pleased and honored to announce our work carried out in North Cyprus. Today, we will be opening a branch of TURMEPA in Girne, and more importantly, we will open a sea and shore observation center in Girne in partnership with the Municipality of Girne and the Near East University, and before the summer of 2009, our training and education program will start.

I would like to thank Mrs. Sıdıka Atalay for accepting the coordination of TURMEPA activities in North Cyprus, and I am confident that we will have all the backing of our President and our Prime Minister, and the people of Northern Cyprus.



Cemal BULUTOĞLULARI Mayor, Turkish Municipality of Lefkoşa, TRNC

Honorable President, Prime Minister, Secretary General of the Islamic Conference and distinguished guests,

Welcome to Lefkoşa.

The habitat mentioned and diversity of living creatures are shrinking everywhere due to an increase in the fragmentation of landscape. The situation in Cyprus is heading towards a formidable shortcoming in terms of environmental resources. In Cyprus, we have already started to see the danger. There is a great need to improve the diversity and human health on the island. Despite the efforts put forward on these specific issues and existing threats, we still need to stress the fact that deeper collaboration is needed amongst the developing nations.

The conclusion that will be reached at the end of ESS 2007 conference will be a torch light for our municipality and we shall consider balanced use of sources in the future services and activities for Lefkoşa. I wish you all a fruitful conference during your stay in Lefkoşa and North Cyprus.



Asım VEHBI Minister of Environment and Natural Resources, TRNC

His Excellency, the President of the Turkish Republic of Northern Cyprus, His Excellency, the Secretary General of the Islamic Conference Organization, Honored guests,

I would like to welcome you all to our conference on Environment, Survival and Sustainability here in the Near East University in the Turkish Republic of Northern Cyprus. Northern Cyprus is honored to host you with this international conference. I believe that the conference will be an important recognition of the issue of this week's environmental topics which concern not only Cyprus but also the whole world. This conference is bringing together almost 1,500 academicians from more than 100 different countries and there are 21 major topics that reflect all areas of environment such as business and environment, environment and health, global warming and a lot of others.

With the industrial revolution in the late 18th century, human beings started to change the global environment. Prior to industrialization the only unsustainable loses from human economic activities were forest cover topsoil. Most societies were relatively based on small and simple technologies using limited amounts of energy with limited territorial area, but the industrial revolution in Europe has changed this. After the revolution, large scale exploitation of fossil fuels enabled the human societies to consume natural resources, the potential of which seemed limitless. Most of our environmental problems today have a global dimension precisely because of the process of development initiated by the industrial revolution. After the 2nd World War, the world population increased rapidly. With this increase, the world started to use more fossil fuels, but these human activities effected the world adversely and we started to loose biodiversity in the environment. It is stated that every year we are losing at least 50 different species of live hood and every year a vast coverage of agricultural land has been lost due to unplanned development and soil erosion. The forests of the world are declining every year. Waste management of all kinds of waste is another problem including domestic waste and hazardous waste. Societies are producing more waste and waste amounts are increasing every year. The uncontrolled dumping of waste is still continuing specially in developing countries and polluting the soil, air and water resources.

Water shortage is another important problem. The amount of drinkable and usable water is decreasing while we are polluting these resources. Almost two weeks ago, IPCC released the draft project from its fourth assessment report where it puts forward that our climate is changing mainly because of inter human induced efforts. Global atmospheric concentrations of carbon-dioxide, methane and nitrous-oxide have increased as a result of human activities and now far exceed pre industrial values determined from many thousands of years. The global increases in carbon-dioxide concentration are due to primarily fossil use and land use change while those of methane and nitrous-oxide are primarily due to agriculture. The net result of these effects is a global average temperature rise of 6° C in the last century. When we compare its greenhouse gas emissions within those other developed countries, Cyprus as an island may not have significant effects on the global warming but on the other hand, we may be one of the most effected countries



from this problem. According to different United Nations scenarios, the temperature of the island may increase 2 to 4 degrees Celsius in the following century. It is also foreseen that we may have serious water problems and shortages in the near future due to increasing water demand and up to 40% decreases in the precipitation values according to the climate model predictions. Another effect of the climate change expected for Cyprus is an increasing loss of productive land leading to the desertification of the island. We have also been facing serious environmental issues like other developing countries such as problems in waste, waste water management, copper mining related problems such as the CMC and a lot of others. To solve these problems and harmonize with the European Union, the present government of the Turkish Republic of Northern Cyprus has agreed to form a separate ministry for environment: The Ministry of Environment and Natural Resources. The main mission of the ministry is to protect the environment in Northern Cyprus and ensure the sustainable use of its natural resources as well as to preserve its cultural heritage. The role of the ministry is to develop and implement the government's environmental policies in order to achieve its mission in environmental protection, sustainable use of natural resources and preservation of cultural heritage. In particular, our responsibilities include establishing coordination between different ministerial departments internally and with other ministries externally, mainly with Turkey, the European Union and others on issues of sustainability and environmental protection. We have also started to develop necessary policies and legislation. We are reviewing and endorsing different policies and legislation, submitting draft legislations to our Parliament for discussion and approval. We communicate with the media and the public on environmental issues. We provide support for environmental education in all levels of the education system. The environmental policy concerns of the Turkish Republic of Northern Cyprus should be based on economic prosperity and social coherence, taking into consideration the following three key elements.

The first one is sustainable development. Social and economical development will take place in a way that preserves our natural and cultural heritage and resources. The second one is to follow the European Union rules and standards on environmental protection. Our laws will be harmonized with the European Union environmental legislation and policies to protect and preserve our environment and the health and life of our people. The third element will be the establishment of the environmental governments' partnership model among the administration, all sectors of the economy and our people through processes which will both inform about environmental issues and standards and involve people in the associated decision making processes.

Before I finish my words, I would like to express the importance of sustainable development. All of the problems I have mentioned show us that we have to develop in an environmentally sustainable way. We have to protect the environment and preserve our natural and cultural heritage while we are developing.

I would like to thank all of the participants who came from other countries and also I would like to thank the Near East University for this wonderful organization and their great team for their outstanding efforts. I hope that this conference will shed light on most of our regional and global environmental problems. Thank you.



Tahsin ERTUĞRULOĞLU Leader of the National Unity Party(UBP), TRNC

Distinguished contributors, participants and honorable guests,

It is indeed an honor for all of us here in the Turkish Republic of Northern Cyprus to welcome you in a country that supposedly does not exist. Your presence here in the name of knowledge and academic freedom, and above all, in the name of service to humanity will hopefully give a valuable lesson to those who tried so desperately to prevent your participation and contributions to this conference.

Dear friends, you shall be subject to further propaganda and will be delivered misinformation about the circumstances here upon your return to your respective countries. The challenging spirit that you have, the spirit of not bothering about those that stand in the way of knowledge, friendship and partnership and service merit will guarantee the success of this most valuable conference.

In closing, I wish to thank the Near East University for working so hard and for so long in making today a reality.

I wish to thank you all for being with us here today. I wish the conference every success.



Assoc. Prof. Dr. Turgay AVCI Deputy Prime Minister & Minister of Foreign Affairs of TRNC

Your Excellency, Mr President,

Your Excellency, Prime Minister,

Honorable Secretary General of the Organization of the Islamic Conference Prof. Dr. Ekmeleddin İhsanoğlu,

Your Excellencies, distinguished participants, Ladies and Gentlemen,

Today is the day. It is the day of pride and success, the day of international victory. It gives me great pleasure and honor to address a conference of which timing is very important, and welcome you all to the Turkish Republic of Northern Cyprus.

I also would like to thank the Near East University, particularly to its Founder Rector and Honorary President, Dr. Suat I. Günsel, and the Rector, Prof. Dr. Hüseyin Gökçekuş, and many others who have patiently and continuously carried out efforts to bring this very important conference into life. A thousand papers from over 100 countries are going to be presented today. I, myself being an academician for 15 years before being a politician, know the importance of presenting a paper in such a conference. I know the excitement, the feeling, the success of presenting, asking questions and the feeling of success at the end of such a conference. I have participated in many conferences internationally. I have presented many papers in many countries. It is a great feeling; it is a great pleasure. I know your feelings and I know the success and pleasure that you will get at the end of the conference. Even under normal circumstances, conferences and organizing conferences would have been a drowning task, but in a country like this which is under an inhuman political, economical and cultural isolation and embargoes due to Greek Cypriot's political blackmail and pressure, it is much more difficult to organize such events. It is very much appreciated that you have stood up against these immoral efforts by putting science and survival of global environment first in the line rather than politics. The future of our world and of our children needs courageous scientists, thinkers and writers like you who are able to transit between politics and political pressures wherever they are fighting for the survival of humanity and the global environment. The bounties and rich resources of our planet have given their best to civilizations throughout the past, but we have reached a point in time and technology that our activities have exceeded the life saving abilities of the earth. The global challenges and the level of distraction we have caused are too great now.

The issue of globalization of environment and conservation is the most crucial and urgent issue that the whole of mankind face today. The survival and sustenance of our environment and biodiversity has importance for our future, and just opened our commitment to fight and fight hard for our world. Businessmen, scientists, intellectuals, artists, politicians, indeed the whole of humanity, must stand and strengthen our struggle in this issue. The results of this conference must provide us with the strategies of sustainable environmental management through the development



of environment friendly technologies and legislation. We must also show the way for social survival to all global citizens, local governments and non-governmental organizations, and because of this, we have a very challenging but at the same time a noble task. In this context, we also strongly believe that institutions from primary schools to universities throughout the world should make in learning the most important attempts to teach about the environment and to train about the protection of environment. I am pleased to inform you that we have a coalition government in the Turkish Republic of Northern Cyprus and we have a Ministry called the Ministry of Environment and Natural Resources. My friend who spoke a few minutes ago is in charge of this ministry. With these thoughts in mind, I would once more like to take this opportunity to thank Near East University and its Honorary President Dr. Suat İ. Günsel for organizing and hosting the Environment, Survival and Sustainability Conference and wish you success in your deliberations.

I thank you for being here in the Turkish Republic of Northern Cyprus and I am sure you will enjoy your stay here and you will remember us and tell the rest of the world the Turkish Republic of Northern Cyprus is a place to be, a place to visit and a place to enjoy.



Türkekul KURTTEKIN Turkish Ambassador to Lefkoşa, TRNC

Mr. President, Mr. General Secretary of the Organization of the Islamic Conference, Ministers, Members of the Parliament, Distinguished Party Members, Members of the Organizing Committee, Members of the Media,

Let me first comment on the Near East University for organizing this conference and express my pleasure that I have the opportunity to say a few words about the conference.

From my perspective, the conference is significant for a variety of reasons. Firstly, a very important topic will be addressed throughout the conference. It reminds me the 1972 United Nations Conference on the Human Environment held in Stockholm, the 1992 Earth Summit or the United Nations Conference on Environment and Development held in Rio, and the 2002 World Summit on Sustainable Development held in Johannesburg.

The world constituted combined efforts by the international Community to face a common challenge, that is, the protection and preservation of the environment while achieving developmental objectives in the rapidly changing world. In spite of these efforts, the challenge stays pretty much alive. We, the human beings, have disturbed the balances of nature and the environment. However, we have no luxury for skepticism. A few minutes ago, we heard about the cooperation between TURMEPA and HELMEPA from Mr. Rahmi Koç which proved to us that if there is a will this challenge will be gradually met. You, experts from various disciplines, from academy, various policy makers and executives responsible for the implementation in many countries will be discussing ways to overcome this challenge. Major topics of discussion in the conference show the multi dimensional character and the magnitude of that, and the outcome of your discussions and your deliberations will contribute to the efforts to increase world awareness on this important challenge, and I hope it provides useful material for the decision makers by strengthening the bridge between theory and science.

Secondly, the meaning of this conference in my opinion reflects the severity faced by the Turkish Republic of Northern Cyprus with its people and its institutions. Environment, the problems, economic and industrial development are interrelated issues. The importance of minimizing the environmental damage while achieving sustainable development is widely realized in the Turkish Republic of Northern Cyprus, which is a country going through a remarkable development in the recent year with a growth rate approaching 14% in 2005 and with an increase of 7% in 2006. The increasing public awareness in the Turkish Republic of Northern Cyprus about institutional measures such as the establishment of the Ministry of Environment and Natural Resources constitutes a good, encouraging example. Thirdly, this international conference, which we were told is the 12th of its type organized by Near East University, demonstrates the important role of universities in the Turkish Republic of Northern Cyprus. As many of you have mentioned, education was amongst the fields falling within the problems of the community in the 1960's. The progress achieved by the Turkish Cypriots in this field is commendable and demonstrates the



unacceptability of the isolation the Turkish Cypriot people have been subjected to for many years. Even in such circumstances, the Turkish Cypriots have been demonstrating their will and determination to move ahead and to combine forces with the international community to face the common challenges to humanity.

Let me conclude by hoping that this conference will create more awareness around the world and in this respect, the recognition of the Turkish Cypriot People will no more remain unattended. Let me also wish all the distinguished participants of this conference every success and express my sincere hope that your deliberations will contribute to the combined efforts to give a better world to the next generations.



Ferdi Sabit SOYER Prime Minister of TRNC

His Excellency, Mr. President,

His Excellency, General Secretary of the Organization of the Islamic Conference, His Excellency, Minister and Members of Parliament and the very important scholars who have came to our country for this conference,

I would like to greet and welcome you all.

Today is the beginning of a meaningful conference where very important environmental issues will be discussed in this conference hall. As you can see, all the flags in this hall symbolize a different color and a different history of all the nations, and as we also know, the colors of nature are reflected by these flags in this beautiful atmosphere. If nature had been just one color, just yellow or just green, the richness and beauty of living would not be seen and people would not have even been able to fall in love. This colorful atmosphere reflects also the dynamism of human beings. Also, this dynamism provides the humans with the ability to find and change everything in nature which they need. It is because of this developing dynamism that human beings take what already exists in nature and turn it to their benefit. Although there are many differences among all nations we should still cooperate together to protect nature. I strongly believe that this conference will bring very important conclusions. I also believe that although the Turkish Republic of Northern Cyprus and Turkish Cypriot society have been isolated both politically and economically, this conference will have very important outcomes. We want to be recognized in the world with our nation, with our national identity. This conference also gives out this message to the world.

I would like to thank the Near East University, the valuable Rectors, and Scholars for participating in such a conference. I would also like to thank and welcome once again the valuable scientists for coming to our country.



Prof. Dr. Ekmeleddin İHSANOĞLU OIC Secretary General

Your Excellency Mr. President, Mr. Prime Minister, distinguished scholars, Ladies and Gentlemen,

I sincerely greet you all. It gives me great pleasure to be with you here. It is a great pleasure to be at the opening ceremony of this important event: The International Conference on Environment, Survival and Sustainability organized by the Near East University. I am grateful to Near East University for their kind invitation which has enabled me to address such a distinguished gathering. I would also like to thank you all who have worked hard, took part in preparation and realization of this project.

Let me share with you my honest feelings. I am not a newcomer to this island and I have heard a lot about Near East University and I have also heard of its good reputation. Some of my friends' sons and daughters were here as students. I have heard all the facts and data about the universities. I am really impressed.

His Excellencies, Ladies and Gentlemen,

I am not an expert on environment issues but the convening of this important conference is very timely as the subject matter has become a very serious global matter. We read all the reports on a daily basis about the dangers of climate change. Climate change and environmental degradation affect the whole world. Meanwhile we hear the frequent comments of the world leaders about the lack understanding and cooperation on environmental issues which might lead us towards the destruction of our planet and humanity. Global pandemics, deforestation and natural disasters are only a few of the issues that presently affect the globe. All these problems are at the heart of sustainable development that we all need to achieve. We find ourselves helpless today when we see rich nations of the world continuing to load the atmosphere with carbon-dioxide; compromising the well being of human race and pushing our planet to an unknown future. It is obvious that these acts have contributed to a rapid change of climate which has caused global warming, rising sea levels, extreme droughts, erosion of soil, loss of the forests and extinction of the species. Sadly, most of the environment degradation is severely affecting the developing world. Its population is facing severe droughts and dry rivers, while some other areas are facing excess floods, rainfalls, mud slides and loss of properties. I am just back from a long trip to Indonesia and I have seen the negative side of the phenomena there. Ladies and Gentlemen, the catastrophes have also negatively affected ecological imbalance. Hence, they have been posing a serious threat to the genetic pool with ramped out breaks of disasters and leading to more poverty in the undeveloped parts of the world. Recognizing the important role played by the environment in the development and in the progress of its member states, the OIC ten year plan of action, a joined action development for the Muslim world to face the challenges of the 21st century, was developed by the 3rd Extraordinary Summit convened in Mecca in 2005 and attended by all heads of state from 57 OIC countries.



In this context, I would like to bring to your attention the fact that the heads of state present in this Summit in December 2005 made a very strong appeal to all OIC member states and their institutions on the issue and were able to coordinate their environmental policies and positions in the international environmental issues so as to prevent any adverse effects of such policies on their economical development.

Following the adoption of the OIC ten year plan of action, I have organized several meetings with the OIC institutions and stakeholders in the framework of the implementation of the OIC ten year plan of action. The OIC General Secretariat itself is committed to the world capacity and policies to contribute to the global efforts to counter the environmental challenges. The OIC also notes with pleasure that the majority of its many initiatives and activities reflect the facts of important organizations such as UNEP and our parties to various international conventions on environment in particular to the protocol. Joining such conventions reflect the fact that the OIC member states are giving their attention to the international laws and requirements. Such devotion shall certainly provide us with a solid basis for our future efforts suggested by the OIC ten year activity program.

I would like to praise the Near East University for providing the opportunity for the conference participants to address a wide range of crucial issues such as redefining the business of conservation and management of biodiversity, culture heritage and environmental factors, economics, development and sustainability, energy and development, environment and health, the threat of global warming, ecological balance and sustainable environment and social and psychological dimensions of the environmental issues.

Mr. President, Your excellencies, Ladies and Gentlemen,

I am of the view that the environment issue can be viewed from at least two major perspectives: The perspective of science and technology and the perspective of effects and impacts of environment on economic development. The important contributions and inputs from science and technology to ensure sustainable development cannot be denied. However, environmental challenges that we are talking about are mostly trans-boundary ones and cannot be faced with individual efforts of the nations. The very nature of these challenges require that these states should combine their efforts and facilities together. In this context, the OIC member states are called upon by the conclusions of various OIC gatherings and decisions to join hands to collaborate and to synergize their efforts in performing and undertaking research and development to reduce some of the environmental effects and challenges faced by them. Assessing the effects of environmental challenges on economical development also requires regional and global cooperation and coordination. In the domain of sustainable development perspective, one should address the quality and sustainability of our natural resources, the threat of global environmental changes on ecosystems, quality of life in our cities, impact of the use of energy which is essential to our economies and to the way of life. We should be making use of the technologies available with the view of reconciling economical development with environmental sustainability. The achievements of all mentioned goals require coordination, harmonization and synergizing of our entire actions. In other words, we need to follow up very closely all our activities to monitor their progress, to evaluate and assess the impacts and to take recognition of all possible shortcomings.


Naturally, addressing you today in one of the heavenly parts of the world, I cannot emphasize as much as I would like to the importance of environmental studies and undertakings aimed at the protection of the Mediterranean Sea and its ecological diversity.

Ladies and Gentlemen, as I value the timely initiative of organizing this conference on an issue of great relevance for my organization and for our member states considering the excellent academics and research qualities and standards of the Turkish Cypriot Universities, I would also like to mark an appeal from this platform to the universities and scientific institutions around the world particularly those based in the OIC.

Thank you.



Mehmet Ali TALAT President of TRNC

Distinguished guests, dear participants,

As you may have expected, I will not make many remarks about environment or raise much concern about the environment. My remarks will be mainly political but in the concerns of the environment. Possibly you can claim that environmental concerns should cause an impact to unify humanity because the solutions to environmental problems can only be found by cooperation. So, this unifying factor must be a point of consideration, and we, the Turkish Cypriots know the importance of this fact. We know the importance of being unified with the international community because we are under severe isolation on all aspects of life including environmental issues. My Prime Minister mentioned about the lack of cooperation between the two sides. We are under continuous pressure from our neighbors. Everywhere in the world, we are in a struggle against this isolation issue and try to be unified with the world, and I wish that this conference will give fruitful results to the scientific life and to humanity.

Thank you for your participation and I wish you all success.



FINAL REPORT OF THE INTERNATIONAL CONFERENCE ON ENVIRONMENT: SURVIVAL AND SUSTAINABILITY

Environment is a subject that must be brought to the top of international agendas if the threats to sustainability and survival are to be countered. It cannot continue to be seen as something to be added on to the plans of commercial enterprises or as a minor component of poverty-alleviation programs. Economic development cannot eliminate poverty without conserving natural resources and maintaining ecosystem services. Nor can productive activity ignore the significant effects of resource extraction and waste generation. Environment must be the central focus of national and international programs at all levels.

The International Conference on Environment: Survival and Sustainability, held at the Near East University, Nicosia, Northern Cyprus 19-24 February 2007, dealt with environmental threats and proposed solutions at all scales. The 21 themes addressed by the conference fell into four broad categories:

1. Threats to Survival and Sustainability

Global warming and other climate changes pose a major threat to natural and human systems throughout the world. Major impacts addressed ranged from dieback of tropical forests to altered ecosystem functions in temperate and boreal systems, changes in sea level and in polar and alpine systems, as well as impact on water supply, agriculture and extreme weather events. Pesticides threaten natural ecosystems and human health. Health is also threatened by diseases, pollution and many forms of environmental degradation. Natural and human-made disasters interact to threaten societies in many ways.

2. Technological Advances towards Survival and Sustainability

Environmental science and technology are advancing rapidly, but are not in themselves sufficient to counter the growing threats to environment. Important areas include integrated water management, new and renewable energy sources, and conservation and management of biodiversity.

3. Activities and Tools for Social Change

Activities and tools that can be applied to move society towards greater sustainability were emphasized at the conference. These included environmental law and ethics, environmental knowledge and information systems, media, environmental awareness, education and lifelong learning, the use of literature for environmental awareness, the green factor in politics, international relations and environmental organizations.



4.Defining Goals for Sustainable Societies

The new directions that societies must take include considerations of economics, development and sustainability, redefinition of the interests of business, incorporating cultural heritage, the seas, ecological balance and sustainable environment, and the social and psychological dimensions of environmental issues.

The breadth of the issues addressed at the conference made clear the need for greatly increased interdisciplinary and international collaboration if survival and sustainability are to be achieved. The exchanges at the conference represent a step in this direction.

Cyprus is getting an equal share from these developments and 51 species are under a threat of extinction. Out of 10 regional mini-hotspots within the principal foci in the Mediterranean, and also considering that Cyprus is island number two with a rich plant diversity and narrow endemism, there is a need for protection of its biodiversity.

The matter of global sustainable development actually has a connotation for change of life styles. This calls for

-interactions and understanding of people the world over,

-fair and equitable distribution of benefits derived from

resources,

-conservation of biodiversity and protection of our resources,

-the water use efficiency is very important as the availability of water is becoming scarce,

-we need more international collaboration and research for wider and reliable speculation,

-management of plans and their implementation to save the critical aspects of our heritage and environment,

-cooperation of scientific disciplines is necessary to address the situation,

-countries must work together and minimize the impact of

borders on science and maximize the benefit for all mankind,

-in order to obtain global sustainability, the curses of overconsumerism should be overcome by an appeal to social and spiritual values,

-for making the world a happy home for everyone, transfer of knowledge has to take place across nations,

-environment and sustainability have to be treated globally, not just locally, before time runs out.

About 2,052 participants from 108 countries from all around the world joined us to make 1,413 presentations and discuss environmental issues from a variety of perspectives.



Global Environmental Strategy is a Must. As I mentioned on the first day of the conference, "ENVIRONMENT DOES NOT UNDERSTAND POLITICS". "IT HAS NO BOUNDARIES OR BORDERS".

This Conference has contributed to the worldwide debate and tried to create a multi-disciplinary discussion forum where experts from various disciplines were able to discuss environmental issues in 21 different fields.

Thanks to the 2,052 participants from all over the world for making this interdisciplinary conference a success. Their active role raised the scientific level of this conference.

I believe this conference has scientifically contributed to the solutions of environmental problems, and hope you have enjoyed your stay in our beautiful country.

Thank you

Prof. Dr. Hüseyin Gökçekuş





LIST OF PAPERS AND POSTERS

VOLUME 1

MT-1: BUSINESS AND ENVIRONMENT : REDEFINING INTERESTS

| SUSTAINABLE INDUSTRIAL GROWTH: STRATEGIES AND IMPLEMENTATION Jurgis Kazimieras Staniskis – LITHUANIA (<i>Oral</i>) | 1 |
|---|-------|
| INHERENT PARADOXES IN THE INTERNATIONAL REGULATION OF INDUSTRIAL ECOLOGY: CAN SUCH LEGISLATION BE CONSIDERED SUSTAINABLE FOR THE ELECTRONICS INDUSTRY? Julian Scott Yeomans, Yavuz Gunalay – CANADA -TURKEY (<i>Oral</i>) | 11 |
| NEW DETERMINATION OF INTERESTS IN THE FUTURE OF RELATIONSHIP BETWEEN THE ENVIRONMENT AND BUSINESS Zehra Gül – TURKEY (<i>Oral</i>) | 21 |
| THE ROLE OF THE ENVIRONMENTAL AUDIT FOR THE REINFORCEMENT OF THE ECONOMIC AND ENVIRONMENTAL CONDITIONS OF THE ORGANISATIONS Maria da Conceição da Costa Marques – PORTUGAL (<i>Oral</i>) | 37 |
| ENVIRONMENTAL COMMUNICATION AS A REDEFINING POSSIBILITY Pernille Almlund – DENMARK (<i>Oral</i>) | 53 |
| INNOVATIVE TECHNOLOGIES IS NOT SUPPORTING ENVIRONMENTAL: SOCIAL AND ECONOMIC SUSTAINABILITY OF THE DEVELOPING COUNTRIES OF THE EASTERN WORLD Saeed A.K. Lodhi, G. R. Mughal, Zakia Shoab – PAKISTAN (<i>Oral</i>) | 67 |
| NEW RULES OF BUSINESS CONDUCT: AN INVESTIGATION ABOUT SUSTAINABILITY ISSUES IN THE CHEMICAL SECTOR Saime Önce, Nuray Tokgöz – TURKEY (<i>Oral</i>) | . 83 |
| THE DEVELOPMENT OF THE FOREIGN TRADE AS ONE OF THE ESSENTIAL CONDITIONS FOR THE GROWTH OF ECONOMY IN LITHUANIA Rasa Glinskienė, Daiva Beržinskienė, Birutė Darškevičiūtė – LITHUANIA (<i>Oral</i>) | 95 |
| INFLATION TARGETING POLICY AS A MONETARY POLICY INSTRUMENT IN DEVELOPING COUNTRIES Serdar Altınok, Hakan Acet, Murat Çetinkaya, Abdulkadir Develi – TURKEY (<i>Oral</i>) | 111 |
| ENVIRONMENT-TRADE RELATIONSHIP AND CE-THE CASE OF EU AND TURKEY Ayşegül Samsunlu – TURKEY (<i>Oral</i>) | 121 |
| THE ROLE, RESPONSIBILTY AND IMPACT OF BUSINESS IN DEVELOPING ECO-EFFICIENT TECHNOLOGIES AND BIO-TRADE R. Esra Demirdogen – TURKEY (<i>Oral</i>) | . 129 |
| THE RELATIONSHIPS BETWEEN MACROECONOMIC INDICATORS AND BANKING PERFORMANCES OF TURKEY AND THE EU COUNTRIES Gülhayat Gölbaşı Şimşek, Seher Arıkan Tezergil – TURKEY (<i>Oral</i>) | 143 |
| CLIMATE CHANGE AND BUSINESS STRATEGY Olivier Boiral – CANADA (<i>Oral</i>) | 169 |
| BUSINESS AND THE ENVIRONMENT - INTERPRETATION AND METHOD APPLICATION OF PUBLIC INVOLVEMENT Slavka Sufi-Mićić – BOSNIA AND HERZEGOVINA (<i>Oral</i>) | 181 |
| | |



VOLUME 2

MT-2: CONSERVATION AND MANAGEMENT OF BIODIVERSITY

| DATA INVENTORY AND MONITORING IN THE COASTAL DUNES OF KAZANLI / TÜRKİYE A CASE STUDY FOR CONSERVATION PLANNING K. Tuluhan Yılmaz, Süha Berberoğlu, Halil Çakan, Hakan Alphan, Yüksel İzcankurtaran –TURKEY (<i>Invited</i>) | .187 |
|---|-------|
| SEASONAL GROWTH EFFECT ON HYDRAULIC CHARACTERISTICS OF THE MANGROVE EXOECARIA SP IN BATTICALOA, SRI LANKA Printhan Manoharan, V. Nimie – SRI LANKA (<i>Oral</i>) | 199 |
| CULTURAL PERSPECTIVE AND BIODIVERSITY CONSERVATION IN UPLAND MOUNTAINS ECOSYSTEMS OF WESTERN GHATS OF INDIA: CHALLENGES & OPPORTUNITIES Archana Godbole – INDIA (<i>Oral</i>) | .221 |
| A POPULATION STUDY OF JOHANNESTEIJSMANNIA LANCEOLATA (ARECACEAE) IN MALAYSIA Rozainah Mohamad Zakaria – MALAYSIA (<i>Oral</i>) | .231 |
| PHYSIOLOGICAL GENETIC BASIS OF RESISTANCE OF SOME DURUM WHEAT (T.DURUM DESF.) VARIETIES TO DROUGHT | 227 |
| CONSERVATION AND MANAGEMENT OF CROCUS spp. | . 237 |
| Hasan Vurdu, İ. Sevinç Kravkaz – TURKEY (<i>Oral</i>) | . 241 |
| SUSTAINABILITY OF THE LIVE BIRD TRADE IN TANZANIA: QUOTAS AND HARVESTS Thade Clamsen, Charles Mlingwa – TANZANIA (<i>Oral</i>) | .249 |
| BIODIVERSITY CONSERVATION ISUES IN ANTHROPIZED MARSHLANDS A TWO YEAR STUDY OF INSULA MARE A BRĂILEI Liliana Vasiliu-Oromulu, V. Sanda, Viorica Honciuc, Sanda Maican, Minodora Stănescu, M. Falcă, Cristina Munteanu, Cristina Fiera, M. Dumitru, Daniela Răducu – ROMANIA (<i>Oral</i>) | 255 |
| NATIONAL APPROACH TO THE CONVENTION ON BIOLOGICAL DIVERSITY Ş. Doğanay Yayım – TURKEY (<i>Oral</i>) | 263 |
| SCRUTINIZING THE GEOPHYTES IN TERMS OF BIODIVERSITY Nilüfer Seyidoğlu, Murat Zencirkıran – TURKEY (<i>Oral</i>) | .271 |
| VEGETATION AS A BIOTIC INDICATOR OF SOIL AND WATER QUALITY IN AKARCAY BASIN (TURKEY) Ahmet Serteser, Yılmaz Icaga – TURKEY (<i>Oral</i>) | . 277 |
| SHORT TERM EFFECTS OF ROYAL JELLY ON SPERM QUALITY IN OF JUVENILE RAINBOW TROUT (ONCORHYNCHUS MYKISS W., 1792). Faruk Aral, Erdinç Şahinöz ',Zafer Doğu – TURKEY (<i>Oral</i>) | 287 |
| EVALUATION OF ALGAL FLORA OF THE INFRALITTORAL ZONE AT A NORTH CYPRUS MARINE ECOSYSTEM | |
| Mehmet Öztürk , Ergün Taşkın, Oğuz Kurt , Salih Gücel TURKEY, NORTHERN CYPRUS - (Oral) | .295 |
| DETERMINATION OF SOME REPRODUCTION CHARACTERISTICS IN MASTACEMBELUS MASTACEMBELUS (Bank & Solender, 1794) LIVING IN ATATURK DAM LAKE. | |
| Erdinç Şahinöz, Zafer Doğu, Ramazan Şevik, Faral Aral – TURKEY (Oral) | .305 |



| CONSERVATION OF BIODIVERSITY IN AGRICULTURAL LANDSCAPE BY SUSTAINABLE LAND USE IN CONDITIONS OF SW SLOVAKIA Alexander Fehér – SLOVAKIA (<i>Oral</i>) |
|---|
| SOME ECOLOGICAL CHARACTERISTICS OF AGROPYRON TRICHOPHORUM IN SUMMER RANGELANDS IN THE NORTH OF IRAN (MAZANDARAN) Ghasem ali Dianati Tilaki – IRAN (<i>Oral</i>) |
| THE PHYLOGENETIC AND BIOGEOGRAPHIC ANALYSIS OF HERACLEUM L. (UMBELLIFERAE) OBSERVED FROM ITS DNA SEQUENCE DATA Meltem Maras , Aysel Kekıllıoglu – TURKEY (<i>Oral</i>) |
| CITRIC-ACID AND WATER-PRESOAKING ENHANCE SEED GERMINATION OF SCOTS AND ANATOLIAN BLACK PINE Derya EŞEN, Oktay Yıldız, Aslıhan Kabtan – TURKEY (<i>Oral</i>) |
| ANALYSIS OF POLYMORPHISM AT THREE MILK PROTEIN GENES IN NATIVE CATTLE BREEDS OF TURKEY AND THEIR USE FOR MANAGEMENT Havva Dinc, Evren Koban, Ebru Saatci, Emel Ozkan, Mesude Iscan, Inci Togan – TURKEY (<i>Oral</i>) |
| THE LISE OF CAMEDA TDADS FOR DETERMINING THE DESENCE OF MEDIUM AND LADGE SIZED |
| MAMMALS IN MARMARIS, TURKEY Anil Soyumert, Oksal Macar, Behzat Gürkan – TURKEY (<i>Oral</i>) |
| THE EFFECTS OF LAND USE ON BIOMASS AND CATABOLIC DIVERSITY OF SOIL MICROBIAL COMMUNITIES Mohammad Asghari Pour, A. Rahmani – IRAN (<i>Oral</i>) |
| CONSERVATION AND MANAGEMENT OF BIODIVERSITY: AN INDIAN PERSPECTIVE Pranav Vyas, Subramanya Sirish Tamvada – INDIA (<i>Oral</i>) |
| EFFECT OF CONSERVATION ON PLANT DIVERSITY IN SEMIARID REGION OF IRAN H.R. Naseri , Gh. Zehtabian , H. Azarnivand , S. Yousefi Khangah – IRAN (<i>Oral</i>) |
| THE RECOGNITION OF PLANT ASSOCIATIONS AND COMPOSITION ELEMENTS OF SANGCHAL FORESTS OF MAZANDARAN, IRAN Rouhi-Moghaddam Einollah, Moslem Akbarinia , Seyed Gholamali Jalali, Seyed Mohsen Hosseini – IRAN (<i>Oral</i>) |
| THE LANDSCAPE IMPLEMENTATIONS THREATENING BIODIVERSITY IN URBAN AREAS: SOME SAMPLES OF EASTERN BLACK SEA REGION |
| Mustafa Var, Emrah Yalçınalp, Müberra Pulatkan – TURKEY (Oral) |
| THE EFFECTS OF PLANTATION ON BIODIVERSITY AND REGENERATION OF WOODY SPECIES Leila Vatani, Moslem Akbarinia – IRAN (<i>Oral</i>) |
| 399 MAPPING THE BIODIVERSITY OF LAND SNAILS IN TURKEY: A PRELIMINARY STUDY Ümit Kebapçi, M. Zeki Yildirim – TURKEY (<i>Oral</i>) |
| A DISCUSSION PAPER ON PROBLEMS, ROOT CAUSES AND SUSTAINABLE USE OF PAKISTAN WETLAND'S BIODIVERSITY |
| Muhammad Naeem Khan, Zulfiqar Ali, Muhammad Akhtar – PAKISTAN (<i>Oral</i>) |
| THE MANAGEMENT OF THE MARINE BIODIVERSITY IN GALLIPOLI PENINSULA NATIONAL HISTORICAL PARK, CANAKKALE-TURKEY Sükran Cirik Yesim Büyükates Mehmet Akhulut Herdem Aslan Özgür Emek İnanmaz Ekrem Sanver Celik Suat Ates Özgür |
| Cengiz, emine ş. Okudan, İlknur Ak, Ali İşmen, Çiğdem Yığın, Füsun Erkan Yurdabak, Muhammet Türkoğlu, Uğur Özekıncı, Özcan Özen, Deniz Anıl Odabaşı, Fikret Çakır, Pınar İşmen, Sezginer Tunçer, Mustafa Alpaslan, Alkan Öztekın, Serkan Özden – TURKEY (<i>Oral</i>) |



| SALINITY EFFECTS ON GROWTH AND STOMATAL BEHAVIOUR IN STRAWBERRY PLANTS Ece Turhan, Atilla Eris – TURKEY (<i>Oral</i>) | .453 |
|--|-------|
| ANTIOXIDATIVE ENZYME ACTIVITIES IN ONION (ALLIUM CEPA L.) GENOTYPES Ece Turhan, Hatice Gulen, Ahmet Ipek, Atilla Eris – TURKEY (<i>Oral</i>) | 459 |
| CLUSTERING OF SOME LOCAL COMMON BEAN PHASEOLUS VULGARIS L.) GENOTYPES BASED ON CARBOHYDRATE METABOLISM Nezihe Koksal, Ece Turhan, Ahmet Ipek, Hatice Gulen, Atilla Eris – TURKEY (<i>Oral</i>) | .467 |
| THE NEED FOR CONSERVATION OF AFROMONTANE RAINFORESTS WITH THE OCCURRENCE OF WILD COFFEA ARABICA POPULATIONS IN ETHIOPIA Feyera Senbeta, Tadesse Woldemariam, Manfred Denich, Sebsebe Demissew – ETHİOPİA (<i>Oral</i>) | .475 |
| DOCUMENTING AND COMPARING PLANT SPECIES DIVERSITY BY USING NUMERICAL AND PARAMETRIC METHODS IN KHAJE KALAT, NE IRAN H. Ejtehadi, R. Soltani, H. Zahedi Pour – IRAN (<i>Oral</i>) | 487 |
| ENVIRONMENT EFFECT ON HETEROSIS EXPRESSION M. Sehabi, L. Mekliche – ALGERİA (<i>Oral</i>) | .493 |
| EXPERIENCES WITH FAST GROWING FOREST TREE SPECIES S. Ayan, A. Sıvacıoğlu – TURKEY (<i>Oral</i>) | .501 |
| FRAMEWORK FOR EVALUATION OF BIODIVERSITY SERVICES: PROBLEMS AND PROSPECTS Nandkishor More – INDIA (<i>Oral</i>) | 515 |
| CONSERVATION OF BIOLOGICAL DIVERSITY IN THE WORLD AND IN TURKEY Zuhal Dilaver – TURKEY (<i>Oral</i>) | 521 |
| SHOULD (EUROPEAN) TREES HAVE STANDING? IMPROVING ACCESS TO THE COMMUNITY JUDICATURE THROUGH IMPLEMENTATION OF THE AARHUS CONVENTION Grainne Gilmore – IRELAND (<i>Oral</i>) | 529 |
| IN VITRO SHOOT REGENERATION OF IRONWORT (SIDERITIS STRICTA BOISS & HELDR.) Dudu Özkum, Rukiye Tıpırdamaz – NORTHERN CYPRUS, TURKEY (<i>Oral</i>) | . 537 |
| BIODIVERSITY OF THE SPECIES BELONGING TO TRIGONELLA L. Z. J. Mammadova – AZERBAIJAN (<i>Oral</i>) | 545 |
| ALLELOPATHIC PROCLIVITIES OF TREE LEAF EXTRACTS ON SEED GERMINATION AND GROWTH OF WHEAT AND WILD OATS Muhammad Azim Khan – PAKISTAN (<i>Oral</i>) | 551 |
| PLANT DIVERSITY AND SUSTAINABLE USE OF GRASSLANDS IN ÇANAKKALE-TURKEY AND THEIR ROLE IN EROSION CONTROL Hakan Hakyemez, Altıngül Özaslan Parlak, Sezgin Çelik, Ahmet Gökkuş TURKEY(<i>Poster</i>) | .557 |
| ECOLOGY OF CENTAUREA SOLSTITIALIS SUBSP. SOLSTITIALIS L. Sezgin Çelik, Kürşat Özkan, Ersin Yücel – TURKEY (<i>Poster</i>) | .565 |
| INVESTIGATION ON GROWING UP OF HELIANTHUS ANNUUS L SEEDS WHICH WERE EXPOSED BY MAGNETIC FIELD Savil Value, Erein Karabagak, İgmat Lugal, TUPKEY (Poster) | 571 |
| THE FIRST RECORD OF MACROBRACHIUM NIPPONENSE | .371 |
| Saeid Gorgin – IRAN (Poster) | 581 |



| BIOLOGICAL CONTROL OF AQUATIC PLANTS USING GRASS CARP: IMPLEMENTATIONS IN TURKEY Mine Uzbilek Kırkagac – TURKEY (<i>Poster</i>) | .587 |
|---|-----------|
| INTERACTIONS BETWEEN DROUGHT STRESS AND LEAF ROLLING OF CTENANTHE SETOSA (ROSC) EICHLI Neslihan Saruhan, Asım Kadioglu, Rabiye Terzi, Aykut Sağlam, Nihal Kutlu – TURKEY (<i>Poster</i>) | ER 595 |
| THE FLORISTIC AND FAUNISTIC (LEPIDOPTERA) INVESTIGATION OF ANAMUR HIGHPLATEAUS (ABANOZ- AKPINAR) Ayşe Everest, Yusuf Hüseyinoğlu – TURKEY (<i>Poster</i>) | - 611 |
| A KARYOLOGICAL STUDY ON MATTHIOLA Esra Martin, Ahmet Duran, Murat Ünal, Ayşe Özdemir – TURKEY (<i>Poster</i>) | . 621 |
| TRAGACANTHIC ASTRAGALUSES, A GOOD CUSHION PLANT IN ENVIRONMENTAL SUSTAINABILITY AND RURAL DEVELOPMENT Mohammad Reza Naghavizadeh – IRAN (<i>Poster</i>) | . 627 |
| CYTOTAXONOMIC INVESTIGATIONS ON THE SPECIES C. CHRYSANTHUS(HERBERT) HERBERT Feyza Candan, Teoman Kesercioğlu – TURKEY (<i>Poster</i>) | 637 |
| NUTRITION (N.P.K) OF OAK (Q.CASTANEIFOLIA) SEEDLING IN DIFFERENT LIGHT INTENSITIES Gh. A. Jalali, M. Ghanbari Motlagh, M. Tabari – IRAN (<i>Poster</i>) | . 641 |
| NATURAL OR MANMADE RESTORATIONS OF PLANT COVER OF SPOIL MATERIALS IN ROMANIA Mihaela Paucă-Comănescu, Marilena Onete – ROMANIA (<i>Poster</i>) | 645 |
| ECOTOXICOLOGAL EFFECT OF SOME DIFFERENT ALKALINE METAL SALTS (NACL, KNO3) AND STRONG ACID (HCL, H2SO4) CONCENTRATION ON GERMINATION OF CEDRUS LIBANI SEEDS Ersin Yücel,Kürşat Özkan, Semra Soydam – TURKEY (<i>Poster</i>) | 651 |
| AN INVESTIGATION ON COMPARISON OF ECOLOGICAL AND BIOLOGICAL PROPERTIES OF TWO ENDEMIC CENTAUREA SPECIES FOR TURKEY (CENTAUREA LYCIA AND CENTAUREA LUSCHANIANA) Yavuz Bülent Köse, Ersin Yücel – TURKEY (<i>Poster</i>) | 659 |
| AN INVESTIGATION OF THE EFFECT OF PLANT DENSITY IN INTERCROPPING BETWEEN MAIZE AND BEAN ON YIELD AND COMPONENT OF YIELD IN EAST AZARBIJAN, IRAN. Farhad Farahvash, Habib Amir- Halaji, Farhad Jafari – IRAN (<i>Poster</i>) | 671 |
| EVALUATION OF ALFALFA, CLOVER, AND SAINFOIN DIVERSITY IN EAST AZARBAIJAN, IRAN R. Kanani, Mohammadian M. B. Khorshidi – IRAN (<i>Poster</i>) | . 675 |
| THE POTENTIALS AND CHALLENGES FOR COMMERCIAL TREE PLANTING IN UGANDA: EXPERIENCES FROM NANSEGA FORESTS AND RESORTS Florence Nangendo, James Seggane – UGANDA (<i>Poster</i>) | . 689 |
| OBSERVATIONS ON THE URBAN FLORA OF ISTANBUL (TURKEY) C. Yarcı, M. Serin, V. Altay, N. Şahin, E. Osma, P. Mutlu, B. Eskin - TURKEY (<i>Poster</i>) | . 695 |
| DESERT VEGETATION OF THE MIL PART OF KURA-ARAKS LOWLAND E. M. Gurbanov, K. A. Ibayeva – AZERBAIJAN (<i>Poster</i>) | . 749 |
| CARBOHYDRATE METABOLISM IN PEPPER (CAPSICUM ANNUM L.) SEEDLINGS UNDER HIGH TEMPERATURE STRESS Ahmet Ipek, Ece Turhan, Nezihe Koksal, Hatice Gulen, Atilla Eris – TURKEY (<i>Poster</i>) | . 753 |
| RAPD-PCR ANALYSE OF HYPERACCUMULATOR PLANTS Selcen Babaoğlu, Leyla Açık, Nezaket Adıgüzel, Şebnem Ellialtıoğlu – TURKEY (<i>Poster</i>) | 761 |



VOLUME 3

MT-3: CULTURAL HERITAGE AND ENVIRONMENTAL FACTORS

| THE VERNACULAR TARSUS HOUSES AS A SAMPLE FOR CULTURAL HERITAGE Fehime Yeşim Gürani –TURKEY (<i>Oral</i>) | 769 |
|---|----------|
| ASSESSMENT OF WOOD AS A BUILDING MATERIAL IN TURKEY IN TERMS OF ENVIRONMENTAL SUSTAINABILITY Saadet Toker, Armağan Korkmaz, Hasan Ş. Haştemoğlu – TURKEY (<i>Oral</i>) | 781 |
| NEIGHBOURHOOD SUSTAINABILITY: A COMPARATIVE ANALYSIS IN THE NORTHERN AND SOUTHERN SECTORS OF NICOSIA | 790 |
| VISUAL POLILITION DUE TO FUNCTIONAL TRANSFORMATIONS AT EKINCILER STREET IN DIVARBAKIR. | 789 |
| TURKEY Sule Elhakan, Iclal Aluclu. Fuat Toprak – TURKEY (<i>Oral</i>) | . 823 |
| AN ANALYSIS OF THE URBAN METAMORPHOSIS IN TARLABASI DISTRICT AND ITS IMPACTS ON THE CULTURAL FORMATION Özlem Şenyiğit, N. Ferah Akıncı – TURKEY (<i>Oral</i>) | 829 |
| THE DETERIORATION REASONS AND REHABILITATION SUGGESTIONS OF DIYARBAKIR HISTORICAL HOUSES IN THE CONCEPT OF CULTURAL HERITAGE F. Demet Aykal, Y. Berivan Ozbudak – TURKEY (<i>Oral</i>) | . 839 |
| EFFECTS OF THE ENVIRONMENTAL FACTORS TO CULTURAL AND NATURAL HERITAGE OF PAMUKKALE Ş. Gülin Beyhan, Mehmet Beyhan –TURKEY (<i>Oral</i>) | 851 |
| ECO-DESIGN APPROACH IN FURNITURE DESIGN Tülay Özdemir – TURKEY (<i>Oral</i>) | 861 |
| A NEW APPROACH TO INTEGRATED APPLICATIONS IN CULTURAL HERITAGE DOCUMENTATION Z. Duran, G. Toz - TURKEY (<i>Oral</i>) | . 871 |
| AN ANATOLIAN ANCIENT CULTURAL HERITAGE, THE MIDAS MONUMENT: AN OVERVIEW Mustafa Dursun Çaglar, Nazmi Oruç – TURKEY (<i>Oral</i>) | 881 |
| REHABILITATION OF HISTORICAL BUILDINGS OF ODUNPAZARI – ESKİŞEHİR – TURKEY Burhan Sakallı, Hüsnü Kaptan, Aslı Tunçol, Ayşen Aksu, Saye Nihan Çabuk, Nazmi Oruç – TURKEY (<i>Oral</i>) | 889 |
| AN URBAN OPEN SPACE MODEL FOR MODERN TURKISH REPUBLIC: GAZI FOREST FARM IN ANKARA A. Duygu Kaçar – TURKEY (<i>Oral</i>) | 903 |
| PRE-HISTORICAL LANDSCAPES AND CULTURAL HERITAGE OFFSHORE OF THE BALTIC SEA IN LITHUANI. Vladas Žulkus - LITHUANIA (<i>Oral</i>) | A 911 |
| THE EXAMINATION OF MADRASA BUILDINGS IN KONYA IN ENVIRONMENTAL, USAGE AND STRUCTURAL LEVEL | 017 |
| Esra Talulz, Banuyar Erogiu, Suneyia Siramkaya Buyukşanın – TÜKKEY (<i>Oral</i>) SECOND HOMES IN A COASTAL AREA-MAHMUTLAR SAMPLE Elif Gündüz, Rahmi Erdem – TÜRKEY (<i>Oral</i>) | . 917 |



| THE IMPORTANCE OF CULTURE TOURISM IN OWNING HISTORICAL CULTURE HERITAGE – KILISTRA SETTLEMENT (TURKEY) CASE | |
|---|-------------|
| Ü.Gülsüm Ter, Dicle Aydin, Yusuf Ziya Ter – TURKEY (<i>Oral</i>) | . 941 |
| IZNIK CITY WITH ITS HISTORICAL LANDSCAPE PROPERTIES Murat E. Yazgan, Canan Cengiz – TURKEY (<i>Oral</i>) | 955 |
| ARCHAEOLOGICAL SITE PRESENTATION AS AN APPROPRIATE AND USEFUL MANAGEMENT TOOL: THE EXAMPLE OF LIMAN TEPE PRESERVATION AND SITE MANAGEMENT MODEL, IZMIR, TURKEY Müge Bahçeci – TURKEY (<i>Oral</i>) | . 963 |
| RELATIONSHIP BETWEEN URBAN REVIATLIZATION AND SUSTAINABILITY IN HISTORIC URBAN QUARTERS: TOWARDS A SUSTAINABLE URBAN REVITALIZATION APPROACH Sebnem Önal Hoskara, Beser Oktay, Vebbi – NORHERN, CYPRUS (Oral) | 977 |
| COMPARISON OF THE INTEGRATED AND NON-INTEGRATED PATTERNS IN A SPATIO-TEMPORAL DIMENSI IN THE CONTEXT OF AN ISLAND Murat ŞAHIN, - TURKEY (Oral) | ON . 987 |
| ECONOMETRIC ANALYSIS OF WORLD HERITAGES' INFLUENCE ON TOURISM DEMANDS Sukhong YOON, Maengsern KİM, Seunghoe CHOI- KOREA (Oral) | . 997 |
| THE PHRYGIAN ROCK-CUT ALTARS AND THEIR RESTORATION AND CONSERVATION PROPOSALS Rahşan TAMSÜ, Yusuf POLAT- TURKEY (Oral) | 1005 |
| AMATEUR ARCHAEOLOGY AND ARCHAEOLOGICAL PARK MODEL AT PEDASA: THE MAIN SITE OF THE LELEGIAN CIVILISATION, ON BODRUM PENINSULA Adnan DILER- TURKEY (Oral) | 1015 |
| INTEGRATION OF HISTORICAL MONUMENTS INTO MODERN ENVIRONMENT AND LANDSCAPE IN GERMAN Marko KIESSEL- TRNC (Oral) | NY 1021 |
| THE INTERACTION DYNAMICS OF WATER AND THE ENVIRONMENT Mohammad Esmaeil Asadi – IRAN (<i>Oral</i>) 1 | 1033 |



VOLUME 4

MT-4: ECONOMICS, DEVELOPMENT AND SUSTAINABILITY

| BOTTOM - UP POLICIES AND RURAL DEVELOPMENT PEMBROKESHIRE LEADER+ EXPERIENCE Antonio Prestia – ITALY (<i>Oral</i>) | . 1043 |
|---|-------------|
| THE EFFECTS OF B AMENDED IRRIGATION WATERS ON COTTON YIELD AND B ACCUMULATION IN SOIL AND LEAF TISSUES Sabri Sener, Fidan Akbas – TURKEY (<i>Oral</i>) | . 1057 |
| AN APPROACH FOR ENABLING SUSTAINABLE ACCESS TO URBAN LAND AND LAND TENURE IN THE SOUTHERN AFRICAN COUNTRY OF NAMIBIA | 1071 |
| A QUALITATIVE APPROACH IN ENVIRONMENTAL VALUATION METHOD Kamran Zendehdel, Wim De Keyser, Guido Van Huylenbroeck – BELGIUM (<i>Oral</i>) | . 1081 |
| LANDSCAPE PLANNING AND MANAGEMENT STRATEGIES FOR ZIR VALLEY NEAR ANKARA IN TURKEY Şükran Şahin , Ülgen Bekişoğlu– TURKEY (<i>Oral</i>) | .1101 |
| CULTURAL COLLISION AND PARTTERN RECONSTRUCTION OF NATIONAL FOREST PARK IN METROPOLIȘ A CASE STUDY IN ZIJIN MOUNTAIN, NANJING, CHINA Li Ming-yang - CHINA (<i>Oral</i>) | .1113 |
| GEONOMICS: BOOTSTRAP DEVELOPMENT FOR A SUSTAINABLE PLANET Jeffery J. Smith – USA (<i>Oral</i>) | . 1125 |
| AN ANALYSIS OF RURAL DEVELOPMENT-NATURAL RESOURCE INTERACTION IN TURKEY Ayten Erol, Yusuf Serengil – TURKEY (<i>Oral</i>) | 1133 |
| ECO-FRIENDLY AGRI-PRODUCTION FOR GLOBAL SURVIVAL AND SUSTAINABILITY P. S. Shehrawat – INDIA (<i>Oral</i>) | .1141 |
| ECONOMICS, ENVIRONMENTAL PROTECTION AND SUSTAINABILITY Halil Seyidoğlu – TURKEY (<i>Oral</i>) | . 1155 |
| AN ASSESSMENT OF THE COMMERCIAL VIABILITY AND SUSTAINABLE DEVELOPMENT OF SELECTED NO ALCOHOLIC INDIGENOUS BEVERAGES IN SOUTH AFRICA Isaac Rampedi – SOUTH AFRICA (<i>Oral</i>) | N- .1161 |
| CROP PRODUCTION PLANNING THROUGH EFFICIENT USE OF NATURAL RESOURCES FOR SUSTAINABLE AGRICULTURE | 1170 |
| STEERING TOWARDS A DYNAMIC EQUILIBRIUM OF DEVELOPMENT AND ENVIRONMENTAL SUSTAINABILITY: A DEVELOPING NATION'S PERSPECTIVE | . 1177 |
| P. K. Gogoi, D. K. Chakraborty – INDIA (<i>Oral</i>) LIFE CYCLE ASSESSMENT (LCA) METHOD IN THE BUILDING SECTOR | . 1195 |
| Arzuhan Burcu Gültekin, Gülser Çelebi – TURKEY (<i>Oral</i>) COMPARATIVE ANALYSIS OF IMF POLICIES FOR FINANCIAL CRISES IN TURKEY AND ARGENTINA Nibîl Vildum Murak, Mustafa Özar, TURKEY (<i>Oral</i>) | 1207 |
| ANALYSIS OF THE RELATIONSHIP BETWEEN ECONOMIC GROWTH AND ENVIRONMENT IN TRNC Hüseyin Özdeser – NORTHERN CYPRUS (<i>Oral</i>) | .1219 |
| | |



| ENVIRONMENTAL DIMENSIONS IN DEVELOPING NEWLY RECLAIMED DESERT LANDS Salah Y. Awadalla – EGYPT (<i>Oral</i>) | 255 |
|---|------|
| ENDANGERED NATIONAL PARK: MUNZUR - TURKEY Özgür Yılmazer, Özlem Yılmazer, Servet Armac, İlyas Yılmazer, Yasemin Leventeli – TURKEY (<i>Oral</i>)1 | 275 |
| URBAN AGRICULTURE: AN INSTRUMENT FOR SUSTAINABLE URBAN DEVELOPMENT IN THE METROPOLITAN CITY OF ISTANBUL Ulas Akın – TURKEY (<i>Oral</i>) | 281 |
| USER DEMANDS FOR SUSTAINABLE HOMESERVICES AN AUSTRIAN SURVEY Thomas Madritsch – AUSTRIA (<i>Oral</i>) | 293 |
| ECONOMIC DEVELOPMENT WITH FLEXIBLE EXCHANGE RATE REGIME: TURKISH EXPERIENCE Ayhan Aytac, Fatma Cesur – TURKEY (<i>Oral</i>)1 | 303 |
| ELECTRONIC WASTE – CURRENT STATUS AND MANAGEMENT PRACTICE Suresh Chandra Saxena – INDIA (<i>Oral</i>) | 313 |
| THE NATIONAL PARK OF KARABURUN-A POSSIBILITY TO PROTECT THE MARINE BIODIVERSITY, AND SUSTAINABLE DEVELOPMENT OF TRUISM IN ALBANIA Liljana Elmazi, Evelina Bazini, Ada Kertusha – ALBANIA (<i>Oral</i>) | 1323 |
| DEPENDENCE OF GRAIN QUALITY ON FERTILIZATION, CROP ROTATION AND TILLAGE Nadejda Tododrova, Svetla Bachvarova, Dafina Nikolova, Staika Stratieva – BULGARIA (<i>Oral</i>) | 331 |
| HOW CAN WE COPE ENVIRONMENTAL SUSTAINABILITY WITH TOURISM-BASED ECONOMIC DEVELOPMENT?BEACH NOURISHMENT PROJECTS AS A WAY TO REHABILITATE OUR COASTS AND CONTRIBUTION TO TOURISM Ozlem Unal, Kemal Birdir – ITALY, TURKEY (<i>Oral</i>) | 1339 |
| IN THE CULTURE-ENVIRONMENT RELATIONSHIP FRAMEWORK Solmaz Karabaşa – TURKEY (<i>Oral</i>) | 357 |
| A SUSTAINABLE WASTE WATER MANAGEMENT PROJECT: MEDAWARE Filiz Dilek, İpek İmamoğlu, Gülerman Sürücü, Celal F Gökçay – TURKEY (<i>Oral</i>)1 | 365 |
| CONSUMERS' ATTITUDES ABOUT ENVIRONMENTAL SENSIVITY Cengiz Yilmaz , Tuncer Özdil , Beran Gülçiçek , İdil Altiparmakoğullari – TURKEY (<i>Oral</i>)1 | .379 |
| THE ESTABLISHMENT OF RURAL PRODUCTIVE UNITS Juan Guzmán, Martín Cervantes, Adrián Mendoza – MÉXICO (<i>Oral</i>)1 | 393 |
| ANALYZING OF RELATIONSHIPS BETWEEN TRADE AND ENVIRONMENT: ECONOMIC AND SOCIAL LINKS Nuray Terzi – TURKEY (<i>Oral</i>) | 399 |
| A STUDY ON THE POTENTIALS OF BEYŞEHIR NATIONAL PARK WITHIN THE FRAMEWORK OF ENVIRONMEN SENSITIVE TOURISM (ECOTOURISM) APPROACHES Ü. Gülsüm Ter,Kadriye (Deniz) Topçu,Sedef Eryiğit – TURKEY (<i>Oral</i>) | NT- |
| ENVIRONMENTAL IMPACT ASSESSMENT AND SUSTAINABLE TOURISM. THE CASE OF ALBANIA Liljana Elmazi, Mirela Mersini – ALBANIA (<i>Oral</i>) | 427 |
| PRE-TREATMENT OF INDUSTRIAL WASTEWATER: ISKI'S APPROACH IN TURKEY Ahmet Samsunlu – TURKEY (<i>Oral</i>) | 437 |



| OLIVE OIL AND ITS EXPANSION: SUSTAINING CULTURAL VALUES BY DESIGN Ece Ariburun – TURKEY (<i>Oral</i>) | 149 |
|--|----------|
| ADMINISTRATIVE, MANAGEMENT AND ECONOMICAL EVALUATION OF MUNICIPAL SOLID WASTE COLLECTION SERVICES AND RECYCLING ACTIVITIES IN ISTANBUL METROPOLITAN D. Karadag, S. Sakar, H. Bayhan – TURKEY (<i>Oral</i>) | 463 |
| THE GREEN BUILDING INDUSTRY Suat Gunhan – TURKEY (<i>Oral</i>) | 473 |
| BLUEFIN TUNA (Thunnus thynnus L. 1758) FISHERY, FARMING AND MANAGEMENT IN THE MEDITERRANEAN SEA | 401 |
| COMMUNITY BASED ECO-TOURISM POTENTIALS AT THE DIPKARPAZ NATIONAL PARK AREA: OPPORTUNITIES AND THREATS Dervis Yuksel – NORTHERN CYPRUS (<i>Oral</i>) | 491 |
| ECOSAN AS A RECYCLING/RECOVERY/REUSE APPROACH AND A SUGGESTION FOR THE PROCESSING OF SEPARATELY COLLECTED URINE FOR AGRICULTURAL USE Bilsen Beler Baykal – TURKEY (<i>Oral</i>) | 505 |
| SUSTAINABLE CRITERIA IN MINERAL PROCESSING M. Zeki Doğan, A.Ekrem Yüce, Caner Zanbak – TURKEY (<i>Oral</i>)15 | 515 |
| ENVIRONMENTAL ETHICS IN RELATION TO MINING ACTIVITIES M. Z. Doğan, Ali Güney – TURKEY (<i>Oral</i>) | 521 |
| ORIENTATION OF THE TOURISM SECTOR TOWARD AN EMPHASIS ON ENVIRONMENTALISM AND ECO- FRIENDLY ISSUES Frank Bates, Türkay Yildiz, Işık Özge Yumurtaci – TURKEY (<i>Oral</i>) | 527 |
| TURKEY'S ENVIRONMENTAL POLICIES FOR AGRICULTURAL POLLUTION H.Ece SALALI, Ela ATIŞ, Nurdan ERDOĞAN- TURKEY (<i>Oral</i>) | 535 |
| THE EFFECTS OF ECONOMIC GROWTH AND EDUCATION LEVEL ON AIR-WATER POLLUTION IN OECD COUNTRIES: A PANEL TIME SERIES ANALYSIS Ercan Saridoğan. Sinan Sarisov, M. Kemal Beser – TURKEY (<i>Oral</i>) | 549 |
| QUALITY APPROACH IN PURSUE OF SUSTAINABLE MOBILITY Dalia Susniene, A. Valackiene – LITHUANIA (<i>Oral</i>) | 563 |
| ACHIEVING GREEN PRODUCTION VIA INTEGRATING MANAGEMENT SYSTEMS Maryam Salek Zamani, Ali Salek Zamani, Yagub Salek Zamani – IRAN (<i>Oral</i>) | 573 |
| FOR INCREASING ENVIRONMENTAL SUSTAINABILITY ECO LABELLING AND IMPLEMENTATION IN TURKEY Reha SAYDAN, Sima Nart- TURKEY (Oral) | , 575 |
| ANALYSIS OF SUSTAINABILITY THEORIES Sabri Azgun, Murat Taşdemir – TURKEY (<i>Oral</i>) | 589 |
| TOWARDS ACHIEVING SUSTAINABILITY IN DEVELOPMENT: A CASE OF VARANASI CITY, INDIA D. Mohan ,Saumya Sarkar – INDIA (<i>Oral</i>) | 597 |
| SYSTEM PROBLEMS FOR REGION SUSTAINABLE DEVELOPMENT: THE INDICATORS AND INDICES BUILDING M. Zgurovskiy, G. Statyukha – UKRAINE (<i>Oral</i>) | 509 |



| ENVIRONMENTAL ENRICHMENT BY WATER Vivek P. Kapadia, Mukesh B. Joshi – INDIA (<i>Oral</i>) |
|--|
| RESERVES AND ECONOMICAL EVALUATION OF CONSTRUCTION MATERIALS IN THE LAND OF AZERBAIJAN REPUBLIC |
| Tevfik Ismailov, Ruhangiz Ismailova – TURKEY, AZERBAIJAN (Poster) |
| EVALUATION OF THE YACHT SLIPWAY PLANTS IN TERMS OF ENVIRONMENTAL PROBLEMS AND SOLUTIONS: A CASE STUDY OF FETHIYE-TURKIYE |
| Remzi Karagüzel , Mahmut Mutlutürk, Raşit Altindağ, Rafet Kistir – TURKEY (Poster) |
| ECOLOGICAL CONDITION OF THE ISSYK-KUL REGION Tynybekov Azamat – KYRGYZ REPUBLIC (<i>Poster</i>) |
| MONITORING URBAN GROWTH IN TURKEY: CURRENT TRENDS AND FUTURE PROJECTIONS FOR SUSTAINABLE URBAN PLANNING |
| Nükhet Günbeyaz, N. Gamze Turan – TURKEY (Poster) |

VOLUME 5

MT-5: ENERGY AND DEVELOPMENT: NEW AND RENEWABLE ENERGY

| THE ASSESSMENT OF THE ENVIRONMENTAL BENEFIT OF FAST-GROWING ENERGY WILLOW CULTIVATED FOR RENEWABLE BIOMASS SUPPLYING |
|---|
| Aleh Rodzkin, Siarhei Pazniak, Cheslav Romanovsky – BELARUS (Invited) |
| SEWAGE BIOGAS USED FOR ENERGY GENERATION Suani Teixeira Coelho, Sílvia Maria Stortini González Velázquez, Orlando Cristiano Silva, Vanessa Pecora, Fernando Castro Abreu – BRASIL (<i>Oral</i>) |
| SOUTH ASIA AND MANAGEMENT OF ENERGY SECURITY Musarrat Jabeen – PAKISTAN (<i>Oral</i>) |
| HYDROPOWER ENERGY SOURCE COMBINING WITH OTHER RENEWABLES, IN THE TERITORY OF KOSOVA Zekirija Idrizi, Isak Idrizi, Farudin Hoxha, Kujtim Zena – MACEDONIA, ALBANIA, KOSOVA (<i>Oral</i>) |
| EVALUATION OF ENERGY EFFICIENCY IN APRICOT GARDENS OF WEST AZERBAIJAN PROVINCE /IRAN Naser Akhondi, Abdollah Hasanzadeh Gurttapeh, Mohsen Roshdi, Asal Roohisalari, Abdollah Fatollah Zade – IRAN (<i>Oral</i>) |
| DEVELOPMENT AND APPLICATION OF A NOVEL SORBENT PRODUCTION TECHNIQUE FOR DETERMINATION AND EMPLOYMENT OF THORIUM AS GREEN NUCLEAR ENERGY FUEL R. Esra Demirdogen – TURKEY (<i>Oral</i>) |
| THE FIELD TRIP ABOUT SOLAR ENERGY AND APPLICATIONS OF THE EFFECTS OF STUDENT'S ATTITUDE AND ACHIEVEMENT H. S. Tortop, N. Ç. Bezir, N. Özek, M. Uzunkavak – TURKEY (<i>Oral</i>) |
| BRAZILIAN BIOMASS GASIFICATION TECHNOLOGY FOR RURAL ELECTRIFICATION AT AMAZON STATE – GASEIBRAS PROJECT Suani Teixeira Coelho, MSílvia Velázquez, Sandra M. Apolinario, Beatriz Lora – BRASIL (<i>Oral</i>) |
| TRANSBORDER COOPERATION IN THE POWER GENERATION AMONG SOUTH ASIAN COUNTRIES: OPPORTUNITIES AND THREATS Syed Muzammiluddin – INDIA (<i>Oral</i>) |
| |



| A NUCLEAR PLANTS DEATH AND BIRTH: ENERGY INFRASTRUCTURE COMMEMORATED INTO CULTURAL HERITAGE | <u>,</u> |
|--|------------------|
| Annelie Sjölander-Lindqvist, Petra Adolfsson – SWEDEN (Oral) | . 1793 |
| WIND POWER PLANTS UPDATED SITUATION IN TURKEY AS RENEWABLE ENERGY Levent Yılmaz – TURKEY (<i>Oral</i>) | . 1801 |
| THE DESIGN OF SOLAR COOKER AND PRODUCE OF ITS PROTOTYPE Ercan Köse, Gökhan Özdemir, Ali Keskin, Funda Kahraman – TURKEY (<i>Oral</i>) | .1817 |
| ENERGY SAVING BY USING HEAT RECOVERY DEVICES AT DIFFERENT CLIMATIC REGIONS IN TURKEY Derya Burcu Ozkan, Handan Çubuk, Ozden Agra – TURKEY (<i>Oral</i>) | 1821 |
| ENERGY DISSIPATION AND HYDRAULIC JUMP CHARACTERISTICS IN THE FLOWS OVER THE STEPPED CHANNELS Gökçen Bombar, M. Şükrü Güney – TURKEY (<i>Oral</i>) | . 1833 |
| AN ALTERNATIVE POWER SOURCE: BIOFUEL AND ITS POSITION IN TURKEY Hilmi Erdal, Gülistan Erdal, Kemal Esengün – TURKEY (<i>Oral</i>) | . 1849 |
| THE POTENTIAL BIOGAS PRODUCTION FROM LIVESTOCK MANURES: A CASE STUDY FOR GAP REGION- SANLIURFA Bulent Armagan, S. Batgı – TURKEY (<i>Oral</i>) | .1859 |
| ENVIRONMENTAL POTENTIALS IN IRAN FOR DEVELOPING THE RENEWABLE ENERGY RESOURCES Hassan Zolfaghari – IRAN (<i>Oral</i>) | . 1869 |
| ENVIRONMENTAL RENOVATION OF THE SOLAR HOUSE IN MIDDLE EAST TECHNICAL UNIVERSITY WITH COMPUTER BASED ANALYSIS AND DESIGN TECHNIQUES Ömer Tuğrul Karagüzel – TURKEY (<i>Oral</i>) | 1881 |
| NO CHOICE BUT ENERGY TRANSITION Andrew McKillop –USA (<i>Oral</i>) | . 1903 |
| PEAK OIL AND PEAK GAS: RATIONAL ENERGY UTILISATION AND INTERNATIONAL ENERGY TRANSITION Andrew Mckillop – USA (<i>Oral</i>) | r . 1911 |
| THE EVALUATION OF ENERGY BALANCE OF EGG-PLUM IN WEST AZERBAIJAN PROVINCE Dabdollah Hassanzadeh Gorttapeh, Farmik Vali Mohamadi, Mahnaz Zahedmanesh, Parisa Nikzad,Hosin Ranji – IRAN (<i>Poster</i>) | . 1925 |
| BIOMASS RESOURCES AND MAINLY USING AREAS IN TURKEY İbrahim Bektaş, M. Hakkı Alma, Alaaddin Yüksel, Murat Ertaş – TURKEY (<i>Poster</i>) | . 1931 |
| AN APPROACH BIOMASS FOR FUEL Gülnur Mertoğlu-Elmas –TURKEY (<i>Poster</i>) | .1941 |
| ANALYSIS OF SOLAR RADIATION DATA INCIDENT HORIZANTAL AND TILTED SURFACE CASE STUDY FOR ISPARTA, TURKEY N. Ç. Bezir, H. S.Tortop, N. Özek – TURKEY (<i>Poster</i>) | د 1947 |



MT-6: ENVIRONMENT AND HEALTH

| ENERGY METABOLISM – AS A GENERAL PRINCIPLE – FOR MODELLING THE TRANSFER OF CARBON AND TRITIUM ACROSS ANIMALS D. Galeriu, A. Melintescu, N. A. Beresford – ROMANIA , UK, USA (<i>Invited</i>) | 1953 |
|--|------------|
| HEALTH EFFECTS FROM LOW LEVEL AND ENVIRONMENTAL EXPOSURE TO CHRYSOTILE John A. Hoskins – UK (<i>Invited</i>) | 1965 |
| ENVIRONMENTAL HEALTH ASSESSMENT OF A PRIMARY SCHOOL IN ANKARA, TURKEY S. A. Vaizoglu, F. Temel, C. E. Oguz, O. Sunger, N. O. Azizoglu, A. E. Akgun, C. Guler – TURKEY (<i>Invited</i>) | . 1975 |
| PAIN KILLERS FROM CONUS SPECIES Cem Hami, Laika Gokcekus - NORTHERN CYPRUS, UK (<i>Oral</i>) | 1983 |
| HEALTHCARE WASTE MANAGEMENT IN SAUDI ARABIA. A CASE STUDY Khalid S. Al-shallash, Mohamed M. Shereif - SAUDI ARABIA (<i>Oral</i>) | .1989 |
| BIOPIRACY AND SENSITIVE ISSUES OF ENVIRONMENTAL ETHICS AND INDIGENOUS MECHANISM OF BIODIVERSITY CONSERVATION IN TRIBAL VILLAGES OF BASTAR: AN ANTHROPOLOGICAL APPRAISAL Rabindra Nath Pati – INDIA (<i>Oral</i>) | 1995 |
| INVESTIGATION OF THE CONTAMINANTS IN DRINKING WATER DISTRIBUTION SYSTEM OF İZMİT Ayla Arslan, Sibel Alioğlu – TURKEY (<i>Oral</i>) | 2005 |
| TRENDS AND CURRENT LEVELS OF ORGANOCHLORINE POLLUTANTS IN HUMANS AND ENVIRONMENT IN TURKEY E. Durmaz, İ. Cok – TURKEY (<i>Oral</i>) | N .2015 |
| FATTY ACID COMPONENTS AND ANTIMICROBIAL ACTIVITY OF SEEDS OF ACANTHUS HIRSUTUS BOISS | 2020 |
| Nazli Boke, Levent Şik, N. Ulku Karabay Yavaşoglu, Suneyla Kırmızıgul – TÜRKEY (<i>Oral</i>) MATERNAL CARE AMONG REPRODUCTIVE WOMEN IN SLUMS IN GREATER MUMBAI Vijay M. Sarode – INDIA (<i>Oral</i>) | 2029 |
| THALASSEMIA IN NORTH CYPRUS RELATIONS WITH MALARIA AND THE RESULTS OF THALASSEMIA PREVENTATION PROGRAMME | |
| Gülsen Bozkurt – NORTHERN CYPRUS (<i>Oral</i>) WATER POLLUTION EPIDEMIOLOGY, WATER HYGIENE AND PUBLIC HEALTH Ö Faruk Tekbas – TURKEY (<i>Oral</i>) | 2055 |
| HEAVY METALS Şennur Dabak – TURKEY (<i>Oral</i>) | 2075 |
| PRESERVATION OF THERMAL WATER RESOURCES AND SUSTAINABLE EXPLOITATION FOR THERAPEUTIC | 2 |
| Suleyman Kocdas – TUKKEY (<i>Oral</i>) | 2085 |
| HOW VOLATILE ORGANIC COMPOUNDS EFFECT FREE RADICAL AND ANTIOXIDANT ENZYME ACTIVITES TEXTILE WORKERS | IN |
| Sibel Bayil, Iclal Geyikli (Meram), Ahmet Celik, Hulya Cicek – TURKEY (Oral) | 2099 |



| A TURKISH EXAMPLE ON BREASTFEEDING CHARACTERISTICS OF 0-11 MONTHS OF AGE INFANTS Fehminaz Temel, Dilek Aslan, Vinil Akbulut, Filiz Bulut, Sabri Raza , Güler Tepe – TURKEY (<i>Oral</i>) |
|--|
| PUBLIC HEALTH IMPORTANCE OF RECREATION WATER Zarema Obradović, I. Ćesir –Škoro, E. Čolaković, Edina Čolaković – BOSNIA AND HERZEGOVINA (<i>Oral</i>) 2115 |
| HUMAN HEALTH AND THE ENVIRONMENT. CASE OF ALBANIA Liljana Elmazi, Elsa Gega – ALBANIA (<i>Oral</i>) |
| ANTIOXIDANT VITAMINS (VITAMIN E AND C) IN ACTIVE AND PASSIVE MALE NIGERIAN CIGARETTE SMOKERS O. M. Akinosun, O. G. Arinola, O. O. Oyetayo – NIGERIA (<i>Oral</i>) |
| MICRONUCLEUS INDUCTION AND ALTERATIONS ON BODY WEIGHT IN THE MICE EXPOSED TO LEAD AND MERCURY HEAVY METAL IONS Kültiğin Çavuşoğlu, Emine Yalçın, Meltem Maraş – TURKEY (<i>Oral</i>) |
| IN VITRO ORAL BIOAVAILABILITY TESTING IN HUMAN HEALTH RISK ASSESSMENT OF METAL CONTAMINATED SOILS: A SHORT REVIEW Gerald J. Zagury – CANADA (<i>Oral</i>) |
| NOISE HAZARD AND HEARING IMPAIRMENT IN AN URBAN COMMUNITY IN IBADAN, SOUTHWEST NIGERIA Folashade O. Omokhodion – NIGERIA (<i>Oral</i>) |
| ECONONOMIC VALUE OF IZMIR CULTURE PARK Nurdan Erdogan, H. Ece Salali, Ela Atiş, Bülent Miran – TURKEY (<i>Oral</i>) |
| DETERMINATION OF EXPOSURE LEVELS TO UV AND THE KNOWLEDGE OF THE PEOPLE ABOUT PREVENTIVE MEASURES IN TURKISH REPUBLIC OF NORTHERN CYPRUS Fehminaz Temel, Funda Sevencan, Songül Vaizoğlu,Didem Evci, Faruk Tekbaş, Çağatay Güler – TURKEY (<i>Oral</i>) |
| ASSESSING THE OCCUPATIONAL ENVIRONMENT OF ANESTHESIOLOGY DOCTORS FROM COGNITIVE ERGONOMICS PERSPECTIVE Sarp Uner, Ayca Telatar, Tahsin Gokhan Telatar, Alev Yucel – TURKEY (<i>Oral</i>) |
| SPATIAL DISTRIBUTION OF WELLS AND THE OCCURRENCE OF CHOLERA IN OUALA: THE CASE OF SOME NEIGHBOURHOODS IN THE CITY OF DOUALA CAMEROON Epule Terence Epule – CAMEROON (<i>Oral</i>) |
| A STUDY ON THE KNOWLEDGE, OPINION AND BEHAVIOURS ABOUT CRIMEAN-CONGO HAEMORRHAGIC FEVER AMONG HEALTH CENTER ATTENDANTS Fehminaz Temel, Hakan Altıntaş , Nesrin Çilingiroğlu – TURKEY (<i>Oral</i>) |
| ATMOSPHERIC POLLUTERS RELEASED FROM INDUSTRIAL PLANTS FACTORS OF RISK PERTAINING TO CANCER Biserka Dimiskovska, Katerina Biseva – MACEDONIA (<i>Oral</i>) |
| INFLUENCE OF HIGH ENVIRONMENTAL TEMPERATURE ON THE LEVEL OF SOME HORMONES IN RATS T. Gjyladin (Isai), S. Dinevska, B. Miova, M. Ismaili, A. Abazi – MACEDONIA (<i>Oral</i>) |
| HEALTH STATUS OF PRE-SCHOOL CHILDREN LIVING IN UST-KAMENOGORSK BIOGEOCHEMICAL PROVINCE N. Khussainova, A. Savinkov, L. V. Lim, S. A. Utelbayeva, G. M. Kulniyazova, V. V. Kozhanov, G. A. Urazova, A. L. Salpynova – KAZAKHSTAN (<i>Oral</i>) |
| BACILLUS SUBTILIS MZ-7 WITH ANTAGONISTIC ACTIVITY AGAINST NOSOCOMIAL CLINICAL ISOLATES Muaaz Mutaz Al-Ajlani, Shahida Hasnain – PAKISTAN (<i>Oral</i>) |



| MEDICAL WASTE SURVEY IN A UNIVERSITY HOSPITAL: DO INTERN DOCTORS AND EMERGENCY NURSES KNOW AND PAY ATTENTION TO SEGREGATION OF WASTES? Nur Aksakal, Evin Aras, Mustafa N. İlhan, Sefer Aycan – TURKEY (<i>Oral</i>) |
|---|
| ULTRAVIOLET AND SKIN CANCER Tamer Irfan Kaya – TURKEY (<i>Oral</i>) |
| EFFECTS OF LOCAL CURRENTS ON THE DISTRIBUTION OF FECAL POLLUTION IN THE SOUTH –EASTERN BLACK SEA Nuket Sıvrı, Sinan Guneysu, Ercan Kose, Coskun Eruz – TURKEY (<i>Oral</i>) |
| ENVIRONMENT AND ALLERGIC SKIN DISEASES Nilgün Bilen – TURKEY (<i>Oral</i>) |
| WASTE MINIMISATION AT THE HEALTHCARE INSTITUTIONS AND THE PRESENT STATUS AND PROPOSALS FOR ISTANBUL Tamer Atabarut – TURKEY (<i>Oral</i>) |
| ENVIRONMENT AND HEALTH [PROBLEM OF FLUORIDE IN RAJASTHAN VILLAGE] Sumana V. Pandey – INDIA (<i>Oral</i>) |
| ENVIRONMENTAL EPIDEMIOLOGY Banu Cakir – TURKEY (<i>Oral</i>) |
| BRONCHIAL ASTHMA AND THE ENVIRONMENT Ahmet Uğur Demir – TURKEY (<i>Oral</i>) |
| CHLORINATION LEVEL OF WATER AND PREVALENCE OF VIRAL HEPATITIS IN FLOOD AFFECTED AREAS OF VADODARA CITY Mohsin Shaikh, V. S. Mazumdar, R. K. Baxi – INDIA (<i>Poster</i>) |
| THE EFFECTS OF SELENIUM ON RAINBOW TROUT SPLEEN TREATED WITH HEAVY METALS Zeliha Selamoglu Talas, Ibrahim Orun, Ilknur Ozdemir, Kenan Erdogan – TURKEY (<i>Poster</i>) |
| ANTIBACTERIAL AND ANTIFUNGAL ACTIVITY IN CLADOPHORA GLOMERATA L. KÜTZ. (CHLOROPHYTA) EXTRACTS |
| Semra Ilian, Filiz Savarogiu, Ferdag Çolak – TÜRKEY (<i>Poster</i>) |
| ANTIOXIDANT ACTIVITIES OF THE EXTRACTS OF SOME STACHYS L. (LAMIACEAE) TAXA Nilgün Öztürk, Onur Koyuncu, İsmühan Potoğlu Erkara – TURKEY (<i>Poster</i>) |
| NOISE AND CHILDREN: OUTDOOR SOUND LEVELS IN PRIMARY SCHOOLS Ersin Uskun, Tufan Nayir, Hakan Turkoğlu, Selçuk Kılınç, Ahmet Nesimi Kisioglu, Mustafa Ozturk – TURKEY |
| GLOBAL HEALTH PROBLEM : AVIAN INFLUENZA A (H5N1) Tamer Sanlidag, Elcin Akduman, Sinem Akcali – TURKEY (<i>Poster</i>) |
| NATIONAL ACADEMY OF SCIENCES OF AZERBAIJAN INSTITUTE OF GEOGRAPHY Afig Malıkov – AZERBAIJAN (<i>Poster</i>) |
| A MUSHROOM POISONING IN ISPARTA, TURKEY Mustafa Işıloğlu, Hayrünisa Baş, Hakan Allı, Mehmet İşler, Altuğ Şenol – TURKEY |



VOLUME 6

MT-7: ENVIRONMENTAL AWARENESS, EDUCATION, AND LIFELONG LEARNING

| ENVIRONMENTAL AWARENESS, EDUCATION AND LIFE-LONG LEARNING BANGLADESH M Shamsher Ali – BANGLADESH (<i>Invited</i>) | 369 |
|---|-----------|
| SEEKING ENVIRONMENTAL AWARENESS IN POSTMODERN FICTIONS Serpil Opperman – TURKEY (Invited) | 375 |
| ENVIRONMENTAL EDUCATION IN BOSNIA AND HERZEGOVINA STATUS, VISIONS AND NEEDS Azra Jaganjac , Sanda Midzic-Kurtagic, Paul Ravn Jepsen, Zalkida Hadzibegovic – DENMARK, BOSNIA AND HERZEGOVINA (<i>Oral</i>) | 387 |
| VOCATIONAL EDUCATION AND SUSTAINABLE DEVELOPMENT: EXPLORING THE CONNECTIONS Alberto Arenas – USA (<i>Oral</i>) | 395 |
| ENVIRONMENTAL AWARNESS, EDUCATION AND LIFE LEARNING Devrim. Y. Besim – NORTHERN CYPRUS (<i>Oral</i>) | 417 |
| UNIVERSITY STUDENTS' VIEWS ABOUT A COURSE ON THE SUSTAINABLE DEVELOPMENT: RESULTS OF A NEED ANALYSIS STUDY | 401 |
| USING OUTDOOR THEATRE FOR ENVIRONMENTAL AWARENESS, EDUCATION AND LIFELONG LEARNING A | 421 .T |
| Edwin Njeba Nganji – CAMEROON (<i>Oral</i>) | 435 |
| Oğuz Özdemir, Muammer Tuna – TURKEY (<i>Oral</i>) | 441 |
| UNITED NATIONS DECADE OF EDUCATION FOR SUSTAINABLE DEVELOPMENT (2005-2014): THE INITIATIVES OVERSEEN BY THE ITALIAN NATIONAL COMMISSION Anna Re – ITALY (<i>Oral</i>) | S 451 |
| IMBIBING ENVIRONMENTAL AWARENESS IN SOCIETIES Beyza Şat Güngör – TURKEY (<i>Oral</i>) | 461 |
| F. NIETZSCHE AND MARTIN HEIDEGGER: BUILDING UP AN ECOPHILOSOPHICAL OUTLOOK Ayten Sururi – NORTHERN CYPRUS (<i>Oral</i>) | 471 |
| ECOLOGISTS' TRAINING IN FUEL ENERGY AND CHEMISTRY TECHNOLOGY SPHERE IN AZERBAIJAN STATE OIL ACADEMY | 470 |
| Qarayev Siyavush Farkhad, Akhmedov Zaur Musa – AZERBAIJAN (<i>Oral</i>) 24 PERCEPTION OF ECOLOGICAL RISKS AS AN ESSENTIAL ASPECT OF ECOLOGICAL CONSCIOUSNESS | 479 |
| Smolova Lidia – KUSSIA (<i>Oral</i>) | 485 |
| Nerkis Kural – TURKEY (<i>Oral</i>) | 497 |
| COGNITIVE KNOWLEDGE IN FIFTH GRADE OF THE TURKISH BASIC SCHOOLS Tuğrul Ural, Eren Sarıkaya – TURKEY (<i>Oral</i>) | 505 |



| THE EFFECTIVENESS OF ENVIRONMENTAL EDUCATION ON ENVIRONMENTALLY- SENSITIVE BEHAVIORS Gamze Yücel Işıldar, Feriha Yıldırım – TURKEY (<i>Oral</i>) |
|--|
| A STUDY ON THE UTILIZATION OF THE TECHNOLOGICAL MATERIALS USED IN SCIENCE CLASSES BY TEACHERS IN ELEMENTARY SCHOOLS Mahmut Sarı – TURKEY (<i>Oral</i>) |
| THE RELATIONSHIP BETWEEN THE PLACES WHERE PEOPLE LİVE AND THEIR QUALITY OF LIVING IN TRNC Hakan Atamtürk – NORTHERN CYPRUS (<i>Oral</i>) |
| THE EVALUATION OF ENVIRONMENTAL PERCEPTIONS OF THE STUDENTS AND TEACHERS OF A SECONDARY SCHOOL IN ANKARA F. Sevencan , F. Temel, G. Boztas, S. Vaizoğlu – TURKEY (<i>Oral</i>) |
| EDUCATION FOR SUSTAINABLE DEVELOPMENT: TRANSFORMING LEARNING INTO REAL LIFE ACTIONS: EXPERIMENTING ACTION-BASED LEARNING MODEL (ALM) AT ELEMENTARY SCHOOL LEVEL IN THE CONTEXT OF PAKISTAN Qamar Shahid Siddiqui – PAKISTAN (<i>Oral</i>) |
| CHILDREN'S CURIOSITY ON ENVIRONMENTAL ISSUES: TURKISH CASE Mehmet Erdoğan, Murat Aydemir – TURKEY (<i>Oral</i>) |
| PROMOTION OF NURSERY SCHOOL TEACHER AND JUNIOR GRADE TEACHER EDUCATION FOR ENVIRONMENT AND SUSTAINABLE DEVELOPMENT IN CROATIA Vinka Uzelac, Aleksandra Pejčić, Dunja Andic – CROATIA |
| LIFELONG LEARNING AS NEW PARADIGM OF EDUCATION FOR ENVIRONMENT AND SUSTAINABLE DEVELOPMENT WITHIN THE CONTEXT OF PROFESSIONAL IMPROVEMENT OF TEACHERS ORIENTATED TOWARDS DIRECT RESEARCH OF EDUCATIONAL PRACTICE |
| STANDPOINTS OF PARENTS AND EDUCATORS TOWARDS TASKS OF ENVIRONMENTAL EDUCATION IN KINDERGARTEN |
| Jurka Lepicnik Vodopivec - SLOVENIA (Oral) |
| A COMPARATIVE STUDY OF TEACHER'S ATTITUDES TOWARDS ENVIRONMENTAL ISSUES Cem Birol, Zafer Bekiroğullari, Ceren Paralik – NORTHERN CYPRUS (<i>Oral</i>) |
| EVALUATION OF THE ENVIRONMENT PROTECTION EDUCATION PROJECTS IN THE SPECIALLY PROTECTED AREAS Naim Uzun, Funda Varnacı – TURKEY (<i>Poster</i>) |
| CHILDREN EDUCATION: FOUNDATION FOR GREEN FUTURE Maryam Salek Zamani, Ali Salek Zamani, Yagub Salek Zamani – IRAN (Poster) |



MT-8: ENVIRONMENTAL KNOWLEDGE AND INFORMATION SYSTEMS

| SURVEY OF NATURAL RESOURCES IN THE BASIN OF KUFRINJA VALLEY AND INVESTMENT BY USING | |
|--|-----------------|
| Aiad Ashor Altaay, Ali Abdual Zeahrah Alwaily, Mohammad Yousif al Hity – IRAQ (<i>Oral</i>) | . 2615 |
| AUTOMATED VERSUS MANUAL LINEAMENT ANALYSIS Gulcan Sarp, Vedat Toprak – TURKEY (<i>Oral</i>) | . 2631 |
| EFFECTS OF TELECOMMUTING ON SUSTAINABLE URBAN DEVELOPMENT AND ENVIRONMENT Filiz Alkan Meşhur – TURKEY (<i>Oral</i>) | 2647 |
| HISTORICAL DEVELOPMENT OF THE MERIC RIVER DELTA: FROM 16TH CENTURY TO PRESENT Cankut Ormeci, Semih Ekercin – TURKEY (<i>Oral</i>) | 2657 |
| MULTITEMPORAL CHANGE DETECTION AT THE SALT LAKE IN TURKEY USING REAL-TIME SPOT IMAGER AND IN-SITU SPECTRAL MEASUREMENTS Cankut Ormeci, Semih Ekercin – TURKEY (<i>Oral</i>) | RY 2667 |
| AN INTELLIGENT SYSTEM FOR INTEGRATED SOLID WASTE MANAGEMENT Latifah Abd Manaf – MALAYSIA (<i>Oral</i>) | . 2675 |
| GIS BASED RISK QUALITY OBSERVATION ANALYSIS AT GEDIZ BASIN IN IZMIR METROPOLITAN MUNICIPALITY BOUNDARY Vildan Gündoğdu, Münevver Elele, Gözde Akgün – TURKEY (<i>Oral</i>) | . 2687 |
| REHABILITATION OF ASBESTOS MINING WASTE: A REHABILITATION PRIORITISATION INDEX (RPI) FOR SOUTH AFRICA L. van Rensburg, S. Claassens, J.J. Bezuidenhout, P.J. Jansen van Rensburg – SOUTH AFRICA (<i>Oral</i>) | . 2701 |
| A CASE STUDY ON OPTIMAL LAND USE OF SELCUK (IZMIR) AND ITS ARROUND Emine Zaimoglu, Umit Erdem – TURKEY (<i>Oral</i>) | . 2711 |
| DEFINING LAND COVER TYPE OF EDREMIT REGION IN TURKEY BY USING OPTICAL AND RADAR FUSED IMAGES Y. Kurucu, F. Balik Sanli, M.T. Esetlili – TURKEY (<i>Oral</i>) | 2727 |
| SOIL CLASSIFICATION STUDY USING GEOMORPHOLOGIC BASED METHOD CASE STUDY: ZIDASHT REGIO | N, |
| IRAN Mohsen Maleki, Marzieh Mosayebi – IRAN (<i>Oral</i>) | . 2739 |
| A NATIONAL MONITORING SYSTEM FOR RANGE ASSESSMENT IN IRAN H. Arzani, M. Frahpour, M. Azimi, H. Mirdavodi, M.Borhani, J. Abdollahi – IRAN (<i>Oral</i>) | . 2747 |
| AIRBORNE HYPERSPECTRAL IMAGING SYSTEM FOR MANAGEMENT AND CONSERVATION OF MOUNTAIN FOREST PARK IN KELANTAN, MALAYSIA Kamaruzaman Jusoff, Dahlan Taha – MALAYSIA (<i>Oral</i>) | . 2761 |
| STUDY OF ENVIRONMENTAL DEGRADATION AROUND THE JAJRUD RIVER USING GEOGRAPHICAL INFORMATION SYSTEM AND REMOTE SENSING Ammar Rafiei Emam – IRAN (<i>Oral</i>) | . 2769 |
| PROPOSED STRATEGY FOR ESTABLISHING A TURKISH ENVIRONMENTAL INFORMATION EXCHANGE NET Mehmet Karaoğlan , Mustafa Aydin, Özlem Esengin – TURKEY (<i>Oral</i>) | TWORK . 2775 |
| A DECISION SUPPORT SYSTEM FOR WATER RESOURCES MANAGEMENT D. Ouazar, M. Touji, M.D. Hasnaoui – MOROCCO (<i>Oral</i>) | 2785 |



| ENVIRONMENTAL INSITE: AN ENVIRONMENTAL INFORMATION SYSTEM USED FOR ASSESSING GROUNDWATER QUALITY IN MERSIN Zeynel Demirel, Zafer Özer, Olcay Gülçiçek, Aylin Kaya – TURKEY (<i>Poster</i>) | |
|--|------|
| MT-9: ENVIRONMENTAL LAW AND ETHICS | |
| THE EUROPEAN HUMAN RIGHTS COURT AND ENVIRONMENTAL PROTECTION Nükhet Yilmaz Turgut – TURKEY (<i>Invited</i>) | |
| ENVIRONMENTAL LAW AND FOREST LEGISLATION IN IRAN S. Mohsen Hosseini, Moslem Akbarinia – IRAN (<i>Invited</i>) | |
| LIABILITY OF THE POLLUTANT: CRIMINAL & CIVIL Emel Badur, Burcu Ertem – TURKEY (<i>Oral</i>) | |
| ENVIRONMENTAL RIGHT IN TURKISH CONSTITUTIONAL LAW Funda Çetindağ, İlker Kılıç – TURKEY (<i>Oral</i>) | |
| WHY DO WE CARE? ETHICS AND HONESTY ABOUT ENVIRONMENTAL ISSUES Sevda Caliskan – TURKEY (<i>Oral</i>) | 2853 |
| EVALUATION OF RECENT AMENDMENTS IN ENVIRONMENT LAW Huriye Kubilay, Meltem Kutlu Gürsel, Muhlis Öğütçü – TURKEY (<i>Oral</i>) | |
| SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL JUSTICE Mahir Fisunoglu, Berna Balcı İzgi – TURKEY (<i>Oral</i>) | |
| ENVIRONMENTAL LAW AND ETHICS Ghorban Elmi – IRAN (<i>Oral</i>) | 2879 |
| ASSESSING ENVIRONMENTAL IMPACT ASSESSMENT AN INDIAN CRITIQUE Nawneet Vibhaw – INDIA (<i>Oral</i>) | |

MT-10: ENVIRONMENTAL ORGANIZATIONS: ROLES, PROBLEMS AND PROSPECTS

| HOW THE ENVIRONMENTAL PROFESSIONALS IN TURKEY PERCEIVE THE "ENVIRONMENT" AND ACT? Gamze Yücel Işıldar – TURKEY (<i>Oral</i>) | 5 |
|--|---|
| THE ROLE OF NON GOVERNMENTAL ORGANIZATIONS IN REALIZATION OF SUSTAINABLE DEVELOPMENT: TURKISH CASE | |
| Elif Karakurt Tosun, Canturk Caner – TURKEY (<i>Oral</i>) | 7 |
| ENVIRONMENTAL ESTABLISHMENTS AND ORGANIZATION Aylin Çinçinoğlu Salici, Nurgül Konakli, Onur Boyacigil, Faruk Altunkasa – TURKEY (<i>Oral</i>) | 7 |



VOLUME 7

MT-11: ENVIRONMENTAL SCIENCE AND TECHNOLOGY

| ALTERNATIVE PATH ON SEWERAGE SYSTEM; CONDOMINIAL METHOD AND ITS APPLICATION Umut Türker, Majed Hamad Abu Zahrah, Hüseyin Gökcekuş – NORTHERN CYPRUS (<i>Oral</i>) |
|---|
| SALINITY-ALKALINITY & POLLUTION PROBLEMS IN THE GEDIZ BASIN-TURKIYE Munir Ozturk, Serdal Sakçalı, Hakan Bahadır, Güven Görk, Müslüm Beyazgül – TURKEY (<i>Invited</i>) |
| AMBIENT AIR PATTICULATE DRY DEPOSITION POLLUTANTS (METALLIC ELEMENTS, IONIC SPECIES) STUDY IN TAIWAN |
| Guor-Cheng Fang – TAIWAN (Invited) |
| SOLID WASTE MANAGEMENT IN THE DEVELOPING COUNTRIES: A CASE STUDY IN TURKEY Günay Kocasoy – TURKEY (<i>Invited</i>) |
| MANAGEMENT OF HAZARDOUS ROAD DERIVED RESPIRABLE PARTICULATES USING MAGNETIC PROPERTIES OF TREE LEAVES. |
| K. Prajapati, B.D. Tripathi – INDIA (Oral) |
| RAPID MEASURMENT OF APPLE VINEGAR'S ADDED SODIUM METABISULFITE BY A NEW ULTRASONIC METHOD |
| Gökhan Savaroğlu, Filiz Savaroğlu – TURKEY (Oral) |
| RECLAMATION OF SODIC SOILS THROUGH VERMITECHNOLOGY Abdullah Adil Ansari – TURKEY (<i>Oral</i>) |
| USING OF THE LIGNOSULFONATES: FERTILIZERS Ali Rıza Demirkıran – TURKEY (<i>Oral</i>) |
| MODELING THE AEROBIC BIO-OXIDATION STAGE OF AN INDUSTRIAL WASTEWATER TREATMENT PLANT USING ANFIS AS A SOFTWARE SENSOR G. Civelekoglu, A. Perendeci, N.O. Yigit, M. Kitis – TURKEY (<i>Oral</i>) |
| REMOVAL OF COBALT ION FROM AQUEOUS SOLUTIONS BY LIGNOSELLULOSICS MODIFIED WITH PAN Mustafa Karaboyaci, Fethiye Gode, Aziz Şencan, Mustafa Cengiz – TURKEY (<i>Oral</i>) |
| A STUDY ON APPLICATION OF DIFFERENT DISOLVED OXYGEN (DO) VARIATIONS IN SEQUENCING BATCH REACTOR |
| Engin Gürtekin, Nusret Şekerdağ – TURKEY (Oral) |
| MICROALGAE REMOVAL FROM SYNTHETIC WASTEWATER BY TILAPIA (OREOCHROMIS NILOTICUS AND OREOCHROMIS AUREUS) Abmat Vägaar, Olaguta Kaskinkan, TURKEY (Orgl) |
| Anniet Fuceer, Orcayto Keskinkan – FUKKE F $(07at)$ |
| BIOREMEDIATON OF CD(II)-CONTAMINATED KAOLINE BY RHAMNOLIPID BIOSURFACTANT Yeliz Aşçı, Macid Nurbaş, Yeşim Sağ Açıkel – TURKEY (<i>Oral</i>) |
| PROPOSAL FOR A SOLID WASTE MANAGMENT SCHEME FOR THE TURKISH REPUBLIC OF NORTHERN CYPRUS Selnur Uçaroğlu, Mustafa YILDIRIM, İpek Yilmaz, Orhan Küçükgül, Bülent Topkaya – NORTHERN CYPRUS (Oral)3059 |
| A STUDY ON RECOVERY AND RECYCKLING OF USEFUL MATERIAL IN LEATHER TANNING INDUSTRY Hafiz Moghira Badar, Ahmad Khan, Fatima Batool – PAKISTAN (<i>Oral</i>) |



| COMPARISON OF THE METALS CONCENTRATIONS IN ATLANTIC HORSE MACKEREL, TRACHURUS TRACHURUS, FROM COASTAL WATERS OF TURKEY Aysun Türkmen, Yalçın Tepe, Mustafa Türkmen, Alpaslan Ateş, Kutalmış Gökkuş – TURKEY |
|--|
| EFFECT OF TOTAL AMMONIA NITROGEN CONCENTRATION AND pH ON GROWTH RATES OF LEMNA MINOR Yalçın Tepe, Mustafa Türkmen, Yalçın Töre, Elif Kuzu – TURKEY (<i>Oral</i>) |
| SEQUENTIAL (ANAEROBIC- AEROBIC) TREATMENT OF CHEESE WHEY Cansu Filik İşçen, Semra İlhan – TURKEY (<i>Oral</i>) |
| DECADES OF TIN MINING IN JOS PLATEAU NIGERIA AND A LEGACY OF IMPOVERISHED AGRICULTURAL LAND AND HIGH RADIOACTIVE ELEMENTS: AN OVERVIEW OF INFRASTUCTRAL NEGLIGENCE N.N. Jibiri – NIGERIA (<i>Oral</i>) |
| PARTICULATE MATTER AND PAH POLLUTION IN ON INDUSTRIAL TOWN: DILOVASI CASE Aytuğ Sivaslıgil, Pınar Kuş – TURKEY (<i>Oral</i>) |
| AN INTEGRATED PREVENTIVE PRODUCTION PLANNING PROGRAM WITH WASTE MINIMIZATION Sedef Elker, Sibel Uludag-Demirer – TURKEY (<i>Oral</i>) |
| LEVELS OF HEAVY METALS IN WATER AND FISH (CARASOBARBUS LUTEUS HECKEL, 1843) WERE SAMPLED FROM GÖLBAŞI LAKE, HATAY, TURKEY. Ayşe Bahar Yılmaz, Mustafa Doğan – TURKEY (<i>Oral</i>) |
| IMPACTS OF SOLUTION PH ON ARSENIC REMOVAL BY NANOFILTRATION AND TIGHT-ULTRAFILTRATION MEMBRANES Evrim Celik, Jaeweon Cho, Zhang Yang, Eunkyung Lee, Sungyun Lee, Mehmet Kitis – TURKEY, KOREA, KOREA, KOREA, TURKEY (<i>Oral</i>) |
| NONDESTRUCTIVE TEST TO TACK POLLUTANT TRANSPORT INTO LANDFILL LINERS A. Bezzar, F. Ghomari, H. Q. Wang – ALGERIE, FRANCE (<i>Oral</i>) |
| INVESTIGATION OF BIOACCUMULATION OF COPPER AND NICKEL IONS BY RHIZOPUS DELEMAR Ünsal Açıkel, Tuğba Alp – TURKEY (<i>Oral</i>) |
| COMPARISON OF BIOACCUMULATION AND BIOSORPTION OF COPPER IONS BY CANDIDA LIPOLYTICA Ünsal Açıkel, Tuğba Alp – TURKEY (<i>Oral</i>) |
| ENVIRONMENTAL IMPACTS OF FLY ASHES FROM THERMAL POWER STATION S.A. Kadioğlu, A. Balci, A. Demirak, E. Tilkan – TURKEY (<i>Oral</i>) |
| PLANTS, BRYOPHYTES, EPIPHYTIC MICROORGANISMS AND FUNGI AS BIOINDICATORS OF AIR POLLUTION Marilena Onete, Mihaela Pauca-Comanescu, Ioana Gomoiu, Sorin Stefanuţ, Daniela Şincu – ROMANIA (<i>Oral</i>) |
| IMPORTANCE OF RAPID MIXING TIME ON SLUDGE DEWATERING PROPERTIES S. Sam, M.A. Yukselen – TURKEY (Oral) 3213 |
| TOLUENE INHIBITION OF AN ANAEROBIC REACTOR SLUDGE IN TERMS OF ACTIVITY AND COMPOSITION OF ACETOCLASTIC METHANOGENS |
| O.Ince,M.Kolukirik, Z.Çetecioglu, O.Eyice, N. Ayman Oz, Ozgul Inceoglu, B.Ince – TURKEY (<i>Oral</i>) |
| CLEAN DYEING TECHNOLOGY WITH BASIC NATURAL DYE ON COTTON FABRICS USING ULTRASONIC TECHNIQUE M.M Kamel, H.F. Mansour, H. M. Mashaly, A.A.Haroun – EGYPT (<i>Oral</i>) |
| ADDRESSING SYNERGIES BETWEEN CHEMICAL SAFETY AND SUSTAINABLE PRODUCTION AND USE OF CHEMICALS |
| Sulejma Cehić – SLOVENIA (Oral) |



| ACUTE TOXICITY OF MERCURIC CHLORIDE ON RAINBOW TROUTS AND CHUBS Bülent Verep, E. Sibel Beşli, İlhan Altinok, Cengiz Mutlu – TURKEY (<i>Oral</i>) |
|---|
| REMOVAL OF COLOUR FROM INDUSTRIAL WASTEWATER D. Mohan, S. Sarkar, K. Ankur – INDIA (<i>Oral</i>) |
| APPLICABILITY OF PHOTOCATALYTIC OXIDATION PROCESS TO EFFLUENT OF THE COMBINED WASTEWATER TREATMENT PLANT Ayla Arslan – TURKEY (<i>Oral</i>) |
| TRACE ELEMENT CONCENTRATIONS OF LICHENS NEAR SEYITOMER COAL-FIRED POWER PLANT Filiz Gür, Günseli Yaprak – TURKEY (Oral) |
| REMOVAL OF TOXIC COPPER AND MANGANESE IONS FROM LEFKE-GEMIKONAĞI DAM WATER Selahattin Gökmen, Nilay Taşer – TURKEY, NORTHERN CYPRUS (Oral) |
| DEVELOPMENT AND ENVIRONMENTAL POLLUTION IN TURKEY AND IN KOCAELİ Savaş Ayberk – TURKEY (<i>Oral</i>) |
| ZOOPLANKTON COMPOSITION AND WATER QUALITY OF LAKE GOLBASI (HATAY-TURKEY) Yalçın Tepe, Ahmet Bozkurt – TURKEY (Oral) |
| THE SUSTAINABILITY OF WASTE DISPOSAL: POLLUTION OF UNDERGROUND WATER BY LEACHATES FROM OLD BURDENS (DUMPSITE) Sokefun Olusola Bolarinwa – NIGERIA(<i>Oral</i>) |
| NOISE AS AN INFLUENTIAL ENVIRONMENTAL PROBLEM.CASE STUDY: LEVELS OF DISTURBANCE BY ROAD TRAFFIC NOISE IN THE CITY OF NIGDE. Lale Guremen, Cahit Tagi Celik – TURKEY (<i>Poster</i>) |
| RECOVERY OF ZINC FROM QUARTZ BY RHAMNOLIPID BIOSURFACTANT Yeliz Aşçı, Macid Nurbaş, Yeşim Sağ Açıkel – TURKEY (<i>Poster</i>) |
| DRAINAGE GEOCHEMISTRY AND ENVIRONMENTAL IMPACT OF THE WHITTLE COALFIELD AREA, NORTHERN UK Leyla Kalender – TURKEY (<i>Poster</i>) |
| PROTECTION OF MARBLE USING BIODEGRADABLE POLYMERS Yılmaz Ocak, Aysun Çakan Sofuoğlu, Funda Tıhmınlıoğlu, Başak İpekoğlu, Hasan Böke – TURKEY (<i>Poster</i>) |
| SOLID WASTE MANAGEMENT AT THE SOUTH-EASTERN BLACK SEA COASTLINE Egemen Aras, Mehmet Berkun – TURKEY (<i>Poster</i>) |
| UTILIZATION OF THE RESIDUAL BRINES OF WATER DEMINERALIZERS N.A.Salimova, F.M.Sultanova, L.V.Huseynova – AZERBAIJAN (<i>Poster</i>) |
| BIODEGRADATION OF AZO DYES Jonstrup Maria, Blánques Paqui, Guieysse Benoit – SWEDEN (Poster) |
| PLANT SPECIES OF CMC MINING WASTE AREA AND HEAVY METAL ACCUMULATION Gülriz Bayçu – TURKEY (<i>Poster</i>) |
| GALVANIC WASTE WATER TREATMENT WITH CHELATING MACROPOROUS COPOLYMER AT STATIC AND DYNAMIC CONDITIONS Aleksandra Nastasović, Antonije Onjia, Zvjezdana Sandić, Ljiljana Malović, Sladjana Kljajević, Dragana Đorđević, Dragica Jakovljević – SERBIA (<i>Poster</i>) |



| THEORETICAL SUBSTANITATION OF PROCESS OF RECTIFICATION OF OIL-POLLUTED SOIL. Hasanov G. S, Abdullaev F. Z, Latifov F.I. – AZERBAIJAN (<i>Poster</i>) |
|---|
| THE USE OF PURIFICATION SLUDGE OF PAPER INDUSTRY IN AGRICULTURE Gümüs Funda Gökçe – TURKEY (<i>Poster</i>) |
| DETERMINATION OF SEA POLLUTION IN ALIAGA BAY, IZMIR, TURKEY:7-ETHOXYRESORUFIN O-DEETHYLASE (EROD) INDUCTION IN LEAPING MULLET (LIZA SALIENS). O. K. Ulutaş, A. Şen, B. Tütüncü, İ. Çok – TURKEY (<i>Poster</i>) |
| EXAMINATION OF SOME PARAMETERS FOR ECOLOGICAL GROWTH OF MAIZE IN PELIC VERTISOL I Stoimenova St. Alexieva S. Stratirva F. Dionova A. Taleva N. Kalovanova – BUI GARIA (<i>Poster</i>) 3465 |
| DECOLORIZATION OF TEXTILE DYES BY A FILAMENTED FUNGUS ASPERGILLUS ORYZAE Hatice Ataçağ Erkurt, Mustafa Özgurt, Ayla Özer – TURKEY (<i>Poster</i>) |
| ADSORPTION OF CHROMIUM (VI) BY WOOL Nilgün Balkaya, Nilden Bektas – TURKEY (<i>Poster</i>) |
| REMOVAL OF LEAD FROM AQUEOUS SOLUTIONS BY PHOSPHOGYPSUM TREATED WITH LIME Nilgün Balkaya, Hasan Cesur – TURKEY (<i>Poster</i>) |
| DECOLORIZATION OF DRIMARENE BLUE K2-RL BY FUNALİA TROGII ATCC 200800 CULTURE FILTRATE IMMOBILIZED IN ALGINATE BEADS Emrah A. Erkurt, Mehmet A. Mazmanci, Hatice A. Erkurt, Ali Unyayar – TURKEY (<i>Poster</i>) |
| ZETA POTENTIAL: A NEW WATER TREATMENT AND THE ALUMINUM INDUSTRY Luiz Antonio Ferrari, Romeu Rovai Filho – BRAZIL (<i>Poster</i>) |
| SIMULATION OF AN ACTIVATED SLUDGE TREATMENT SYSTEM USING ASM AND ANFIS MODELS G. Civelekoglu, N.O. Yigit, O. Cinar, M. Kitis – TURKEY (<i>Poster</i>) |
| TOXICITY ASSESSMENT OF METHYL TERT-BUTYL ETHER, TERT-BUTYL ALCOHOL AND FORMALDEHYDE USING REDUCED INHIBITION CONSTANTS W. Cho, K. S. Cho, H. W. Ryu – SOUTH KOREA (<i>Poster</i>) |
| A GRAPHICAL APPLICATION IN TREATMENT OF RESIDENTAL WASTEWATER BY THE ACTIVATED SLUDGE PROCESS |
| S. Serkan Nas, Adem Bayram – TURKEY (Poster) |
| INVESTIGATION OF RADON RISK IN WELL WATER Akkurt, H.A. Yalim, H. Akyıldırım, A. Akkurt, F.B. Ozdemir, R. Unal, A. Sandikcioglu – TURKEY (<i>Poster</i>) |
| THE EFFECT OF SOLAR - COSMIC RAYS ON THE BACKGROUND RADIATION I. Akkurt, N.Ç.Bezir, B. Mavi, H. Akyıldırım, C.Yalçın, F. Kulalı – TURKEY (<i>Poster</i>) |
| SEASONAL AND SPATIAL DISTRIBUTIONS OF THE METALS IN THE WATER, SEDIMENT AND AFRICAN CATFISH, CLARIAS GARIEPINUS, FROM THE RIVER ASI (ORONTES) IN SOUTHERN EAST MEDITERRANEAN AREA OF TURKEY |
| Mustafa Türkmen, Evren Çalışkan – TURKEY |
| GEOSYNTHETIC MATERIALS USED IN WASTE CONTAINMENT SYSTEMS Pelin Aklik – TURKEY (Poster) |
| RADIONUCLIDE EMISSION FROM THE SEYİTÖMER COAL-FIRED POWER PLANT AND THE POPULATION EXPOSURE TO EXTERNAL RADIATION IN ITS VICINITY Filiz Gür, Günseli Yaprak – TURKEY (<i>Poster</i>) 3585 |
| The out, outpoint upruse TOTALET (10000) |



| BIOMONITORING OF TRACE ELEMENTS OF ZINK AND MANGANESE POLLUTION BY THE BARK OF TURK RED PINE (PINUS BRUTIA) IN WESTERN ANATOLIA | ISH |
|--|------|
| Y. Dogan, N. Durkan, S. Baslar, H.Aydin – TURKEY (<i>Poster</i>) | 3595 |
| INDUSTRIAL SOLID WASTE MANAGEMENT IN TURKEY Başak Mesci, Osman Nuri Ergun – TURKEY (Poster) | 3601 |
| MT-12:GLOBAL WARMING: HOW MUCH OF A THREAT? | |
| DEVELOPING COUNTRIES AND THE CHALLENGE OF CLIMATE CHANGE Ishfaq Ahmad – PAKISTAN (Invited) | 3607 |
| GLOBAL WARMING THREAT ON WATER RESOURCES AND ENVIRONMENT Zekai Şen – TURKEY (Invited) | 3623 |
| TRENDS AND VARIATIONS OF AIR TEMPERATURE AND PRECIPITATION SERIES IN NORTHERN CYPRUS Murat Türkeş, Faize Sariş – TURKEY (<i>Oral</i>) | 3657 |
| CONTROL OF GHG EMISSIONS RESULTING FROM THE TRANSPORT SECTOR IN TURKEY Cem Soruşbay, Metin Ergeneman, M. Aydın Pekin – TURKEY (<i>Oral</i>) | 3669 |
| REGIONAL CLIMATE CHANGE AND ITS IMPACTS FOR TURKEY Mehmet Karaca, Ozan M. Göktürk, Omer Lutfi Sen, Barış Onol, Tayfun Kındap, Nüzhet Dalfes – TURKEY (<i>Oral</i>) | 3679 |
| GLOBAL WARMING AND CLIMATIC CHANGES IN PAKISTAN Abdul Razzaq Ghumman, Muhammad Ali Shamim, Raza Ali – PAKISTAN (Oral) | 3687 |
| WHO PAYS THE BILL? – THE IMPACT OF CLIMATE CHANGE ON REAL ESTATE MARKETS Sven Bienert Mrics – GERMANY (Oral) | 3707 |
| SIGNAL AND TREND ANALYSIS OF TEMPERATURE SERIES: A TURKISH CASE Mete Tayanç, Murat Doğruel, Ulaş İm, Mehmet Karaca – TURKEY (<i>Oral</i>) | 3723 |
| INTERNATIONAL CLIMATE CHANGE POLICIES AND TURKEY Deniz Babuş, Muzaffer Yücel – TURKEY (Oral) | 3735 |
| EVALUATIONS ON FOREST RESOURCES MANAGEMENT OF NORTHERN CYPRUS AND NEW PLANNING APPROACH IN ACCORDANCE WITH SUSTAINABILITY AND CLIMATE CHANGE RISK Said Dağdaş, Rüstem Kırış – TURKEY (<i>Oral</i>) | 3747 |
| GLOBAL WARMING: HOW FAR A PROBLEM Somlata Sharma – INDIA (<i>Oral</i>) | 3759 |
| MODELING METHANE EMISSION FROM ÇANAKKALE OPEN DUMPSITE AND ITS EFFECT ON GLOBAL WARMING: A LANDGEM USE APPROACH Edip Avşar, Hasan Göksel Özdilek – TURKEY (<i>Oral</i>) | 3767 |
| INTECDATED ADDOACH IN SEADCHING SUSTAINADIE DEVELODMENT ODOOTHNITIES | |



VOLUME 8

MT 13 -GREEN FACTOR IN POLITICS

| ANOTHER FALSE DAWN? TOWARDS A NON-LEGALLY BINDING INSTRUMENT ON FORESTS - CON ISSUES AND POLITICAL UNCERTAINTIES | TEMPORARY |
|--|-----------|
| David Humphreys – UK (Oral) | |
| GREEN POLITICS AND SOCIAL SUPPORT FOR ENVIRONMENTALISM IN TURKEY Baran Dural – TURKEY (Oral) | |
| THE GREENS IN TURKISH POLITICS TRANSFORMATION FROM AN NGO TO A POLITICAL PARTY Ceren Uysal Oğuz – TURKEY (<i>Oral</i>) | |
| USING THE SLEUTH URBAN GROWTH MODEL TO SIMULATE THE IMPACTS OF FUTURE POLICY S ON URBAN LAND USE IN THE HOUSTON-GALVESTON-BRAZORIA CMSA | CENARIOS |
| Hakan Oguz – TURKEY (Oral) | |

MT-14: INTEGRATED WATER RESOURCES MANAGEMENT

| ANALYSIS OF RESEARCH AND DEVELOPMENT OF SOIL FERTILITY AND WATER MANAGEMENT TECHNOLOGIES IN MALAWI- A REVIEW |
|---|
| D. M. S. Kadyampakeni, V. H. Kabambe – MALAWI (Oral) |
| IMPACTS OF LAND-USE CHANGE ON THE WATER QUALITY OF THE MAIN SOURCE OF PIPE BORNE WATER FOR KUMASI, GHANA (A CASE STUDY OF THE BAREKESE RESERVOIR CATCHMENT AREA) |
| Tyhra Carolyn Kumasi, K. Obiri-Danso, J. B. Ephraim – GHANA (Oral) |
| MULTIPLE PURPOSE FOREST RESOURCES MANAGEMENT: THE WATER PERSPECTIVE Yusuf Serengil, Kenan Ok – TURKEY (<i>Oral</i>) |
| A NEW APPROACH TOWARDS FLOOD CONCERNED SPATIAL PLANNING |
| Mariele Evers, Kai-Uwe Krause, Stefan Tressi – GERMANY (<i>Oral</i>) |
| DECISION SUPPORT SYSTEMS FOR INTEGRATED WATER RESOURCES MANAGEMENT REQUIREMENTS FOR A COMPREHENSIVE APPROACH |
| Mariele Evers – GERMANY (Oral) |
| CONSERVING WETLANDS BY WATERSHED MANAGEMENT, SAMPLE OF LAKE BEYSEHİR (KONYA) Fadim Yavuz Özdemir, Elif Gündüz – TURKEY (<i>Oral</i>) |
| TRADITIONAL WATER MANAGEMENT; AN INSPIRATION FOR SUSTAINABLE IRRIGATED AGRICULTURE IN |
| Majid Labbaf Khaneiki – IRAN (<i>Oral</i>) |
| INTEGRATING ECONOMICS IN TO INVASIVE AQUATIC PLANTS (IAP) MANAGEMENT IN SRI LANKA: ALIEN AOUATIC PLANTS: IS AN ECONOMIC PROBLEM? |
| Sujith Ratnayake, Leel Randeni, Champika Kariyawasam – SRI LANKA (Oral) |
| PARTICIPATORY APPROACH TO SUSTAINABLE WATER RESOURCE MANAGEMENT IN A WATERLOGGED AREA Firdaus Fatima Rizvi – INDIA (<i>Oral</i>) |
| THE EFFECT OF MINING WORKS ON WATER COLLECTION BASIN: ÇATALAN EXAMPLE |
| Mesut Anıl, Ahmet Yüceer, Zülküf Kaya, Bayram Ali Mert, Mehmet Türkmenoğlu – TURKEY (Oral) |



| A SURVEY OF RELATIONSHIP BETWEEN EVAPORATION AND WIND SPEED OF EĞIRDIR LAKE BY USING CLUSTERING TECHNIQUES Veysel Güldal, Hakan Tongal – TURKEY (<i>Oral</i>) |
|---|
| A MANAGEMENT MODEL FOR WATER QUALITY CONTROL USING A GENETIC ALGORITHM Egemen Aras, Vedat Togan, Mehmet Berkun – TURKEY (<i>Oral</i>) |
| OBSERVATIONS ON SUSTAINABLE WATER RESOURCE MANAGEMENT IN TURKEY: THE NEED FOR A COLLABORATIVE APPROACH Ömer Eker, Sultan Bekiroğlu – TURKEY (<i>Oral</i>) |
| REVISION AND MODIFICATION OF WATER QUALITY MONITORING STUDIES IN TURKEY M. Karaman, D. Guler, A. K. Onur, F. Baltacı, S. Tahmiscioğlu – TURKEY (<i>Oral</i>) |
| RIVER BASIN ORIENTED URBAN WASTEWATER TREATMENT IN TURKEY Arslan Alaton, G. Iskender, P. Ongan Torunoglu, M. Gurel, S. Ovez, A. Tanik, D. Orhon – TURKEY (<i>Oral</i>) |
| GENERAL PLANNING APPROACH TO THE LAND USE AT THE RIVER BASIN IN THE CASE: ALTINAPA BASIN IN THE MIDDLE OF ANATOLIA Çiğdem Çiftçi, Havva Alkan Bala – TURKEY (<i>Oral</i>) |
| NEW TECHNOLOGY TO MEASURE THE WATER LEVEL AND THE SEA STATE Christoph J. Blasi – GERMANY (<i>Oral</i>) |
| ECOLOGICAL CONTROL OF A CONDITION OF WATER BODIES IN LARGE CITY N. Ignatyeva, O. Susareva, D. Kuznetsov, O. Pavlova – RUSSIA (<i>Oral</i>) |
| INVESTIGATION OF PUMPING EFFECTS ON GROUNDWATER IN TORBALI A. O. Aksoy, T. Scheytt, M. S. Guney – TURKEY, GERMANY (<i>Oral</i>) |
| TONLE SAP ECOSYSTEM FISH SPECIES BIOLOGICAL GROUPS AND HYDRO-ECOLOGICAL INDEX Nguyen Thi Hai Yen, Kengo Sunada, Satoru Oishi, Kou Ikejima –JAPAN, THAILAND (<i>Oral</i>) |
| WATER RESOURCE AND THEIR PROTECTION IN SLOVAK REPUBLIC Jozef Kriš, Martin Faško, Ivona Škultétyová – SLOVAK REPUBLIC (Oral) |
| SITNICA RIVER FLOOD PROTECTION Zekirija Idrizi, Kujtim Zena, Violeta Hoxha, Isak Idrizi – MACEDONIA (Oral) |
| MODELING GROUNDWATER FLOW IN A RAW MATERIAL SITE OF A CEMENT FACTORY, KOCAELI-DARICA, TURKEY Yeliz Isikli, Nurkan Karahanoglu – TURKEY (<i>Oral</i>) |
| SUSTAINABLE USE OF WATER RESOURCES AND RURAL DEVELOPMENT IN DROUGHT AFFECTED AREAS Giovanni Quaranta, Rosanna Salvia – ITALY (<i>Oral</i>) |
| MULTI DISCIPLINARY MODELING, IN STRATIGRAPHY AND GROUNDWATER STRATIGRAPHY OF THE JORDAN RIVER BASIN Yaakov Ankar, Akiya Elavar, Haim Shulman, Eliahu Bosanthal, ISPAEL (Oral) |
| INDIGENOUS WATER MANAGEMENT SYSTEMS IN ARID AREAS OF SOUTH AFRICA: THE CASE OF THE BATSWANA PEOPLE IN THE NORTH WEST PROVINCE (SOUTH AFRICA) Hassan O. Kaya – SOUTH AFRICA (Oral) |
| ROOF TOP RAIN WATER HARVESTING IN INDUSTRIAL SECTOR Apurba Bhattacharyya – INDIA (<i>Oral</i>) |



| WET MEADOW MANAGEMENT IN ZAMANTI RIVER CROSSING OF BTC CRUDE OIL PIPELINE PROJECT Şükran Şahin, Ekrem Kurum, Arturo Sousa Martin –TURKEY, SPAIN (Oral) | 4155 |
|---|---------------|
| ECOLOGICAL-BASED WATER RESOURCE PLANNING AND MANAGEMENT Henning Schroll – DENMARK (Oral) | 4169 |
| ASSESSMENT OF USLE NOMOGRAPH FOR ESTIMATING ERODIBILITY OF CALCAREOUS SOILS FROM NORTHWESTERN IRAN A. R. Vaezi, H. A. Bahrami, S. H. R. Sadeghi, M. H. Mahdian – IRAN (<i>Oral</i>) | 4183 |
| THE SYSTEMS APPROACH TO DESIGN OF OPTIMAL WATER USAGE AND WASTEWATER TREATMENT NETWORKS M. Zgurovsky, G. Statyukha, O. Kvitka, A. Shakhnovsky, I. Dzhygyrey – INDIA (<i>oral</i>) | 4199 |
| MANAGEMENT OF WATER RESOURCES AND SUSTAINABLE REGIONAL DEVELOPMENT Majid Yasouri – IRAN (<i>Oral</i>) | 4207 |
| ANCIENT ECO-TECHNOLOGY OF QANATS FOR ENGINEERING A SUSTAINABLE WATER SUPPLY IN THE MEDITERRANEAN ISLAND OF CYPRUS Huseyin Gokcekus, Theodore A. Endreny – NORHERN CYPRUS, USA (<i>Oral</i>) | 4219 |
| URGENT ARMENIAN NATIONAL PROBLEM - LAKE SEVAN Gagik Torosyan, Mikayel Harutyunyan, Yeva Torosyan – ARMENIA (Oral) | 4237 |
| THE SIMULATION GEOLOGICAL FOR WATER SHORTAGE FROM JIFARA PLAIN BASIN NORTHWEST OF LII Fathi Elosta – LIBYA (Oral) | BYA 4243 |
| EVALUATION OF BORON IN DRINKING WATER IN SOME VILLAGES OF SEYDISUYU WATERSHED (ESKISE OF TURKEY Demet Uygan, Oner Cetin – TURKEY (<i>Oral</i>) | EHIR) 4255 |
| STOCHASTIC INTEGRATED WATER RESOURCES MANAGEMENT MODELS Nasreddine Saadouli, Habib Saadouli – KUWAIT, TUNISIA (Oral) | 4263 |
| FORECAST OF WATER DEMAND USING ARTIFICIAL NEURAL NETWORK: A CASE STUDY IN ISPARTA Gökhan Yılmaz, M. Erol Keskin, E. Dilek Taylan – TURKEY (<i>Poster</i>) | 4279 |
| WATER RESOURCES MANAGEMENT IN ARID REGIONS OF IRAN A. Salajegheh, A. R. Keshtkar, H. Keshtkar – IRAN (<i>Poster</i>) | 4287 |
| GLOBAL AND REGIONAL FRESHWATER AVAILABILITY AND FUTURE DEMAND Naser Ghavzan Jafari – IRAN (<i>Poster</i>) | 4291 |
| KARST WATER AT NACKARUD, MAZANDRAN, IRAN Jafar Naji – IRAN (<i>Poster</i>) | 4301 |
| ARIDITY PROBLEM IN CYPRUS Zeki Koday – TURKEY (<i>Poster</i>) | 4307 |
| PROTECTION OF WATER SOURCES AND AQUATIC LIVING FROM THE DAMAGES OF AGRICULTURAL CHEMICALS Muhammed Atamanalp, Nilgun Ozdemir – TURKEY (<i>Poster</i>) | 4317 |
| EXAMPLES OF THE SUSTAINABLE ARCHITECTURE IN BOSNIA AND HERZEGOVINA Ahmet Hadrović, Haris Bradic – BOSNIA AND HERZEGOVINA (<i>Poster</i>) | 4325 |
| AN INTERFACE BETWEEN METROPOLITAN AREA AND PERI URBAN EDGE Havva Alkan Bala, Çiğdem Çiftçi – TURKEY (<i>Poster</i>) | 4333 |



| EVALUATION OF ACOUSTICS FOR MEASURING SUSPENDED SEDIMENTS IN RIVERS Ramazan Meral – TURKEY (<i>Poster</i>) | 4343 |
|--|------|
| ASSESSING GROUNDWATER VULNERABILITY: CASE STUDY FOR KARST AQUIFERS Mustafa Yildirim, İpek Yilmaz, Bülent Topkaya – TURKEY (<i>Poster</i>) | 4349 |
| CHARACTERISTICS OF SPRING WATER IN THE MID-BLACK SEA REGION Feza Geyikçi – TURKEY (<i>Poster</i>) | 4361 |

VOLUME 9

MT-15: INTERNATIONAL RELATIONS AND ENVIRONMENTAL ISSUES

| IMPACT OF GLOBALIZATION ON POLLUTION AND RESOURCE DEPLETION: THE CASE OF NIGERIA Mete Feridun, Folorunso Sunday Ayadi, Jean Balouga – NORTHERN CYPRUS, NIGERIA (<i>Oral</i>) |
|--|
| ENVIRONMENTAL SCARCITY AND INTRASTATE CONFLICTS: THE CASE OF NEPAL Fiona J.Y. Rotberg – SWEDEN (<i>Oral</i>) |
| AS AN INTERNATIONAL ACTOR OF ENVIRONMENTAL REGIME INFLUENCES OF EU'S ENVIRONMENTAL POLICIES ON TURKISH ENVIRONMENTAL POLICIES Uğur Yildirim, Sevim Budak, Zehra Gül – TURKEY (<i>Oral</i>) |
| AN EVALUATION OF CIVIL ACTION ON ENVIRONMENT IN THE LIGHT OF INTERNATIONAL DOCUMENTS: CASES FROM TURKEY AND EUROPE Aysu Kes, R. Erdem Erkul – TURKEY (<i>Oral</i>) |
| INTERNATIONAL CONFLICT MANAGEMENT STRATEGIES IN WATER STRESSED REGIONS: A CASE STUDY OF BALOCHISTAN POST 9/11 Musarrat Jabeen – PAKISTAN (<i>Oral</i>) |
| UNDP-ACT – BUILDING ENVIRONMENTAL BRIDGES IN CYPRUS Nicolas Jarraud – USA (<i>Oral</i>) |
| INTERNATIONAL EFFORTS DIRECTED TOWARDS BLACK SEA ENVIRONMENTAL ISSUES Selma Yel, Gökhan Kayadurmuş – TURKEY (<i>Oral</i>) |
| RE-ITERATION OF THE MIDDLE EAST PEACE PIPELINE PROJECT Osman N. Ozdemir – TURKEY (<i>Oral</i>) |
| A SURVEY ON UNDERSTANDING OF SOCIAL RESPONSIBILITY IN TURKISH SMALL AND MEDIUM SIZED INDUSTRIAL ENTERPRISES Güngör Turan – TURKEY (<i>Oral</i>) |
| IMPACT OF DECOMISSIONING OF NUCLEAR FACILITIES ON AFRICAN COUNTRIES Babagana Abubakar – NIGERIA (<i>Oral</i>) |
| INTERNATIONAL RELATIONS AND ENVIRONMENTAL ISSUES Sourav Kumar Keshri, Amit Kulkarni – INDIA (<i>Oral</i>) |
| ENVIRONMENTAL ASPECTS OF THE EUROPEAN UNION NEIGHBOURHOOD POLICY FOR UKRAINE Mykola Shestavin, Maryna Yepik – UKRAINE (<i>Oral</i>) |
| IR THEORY AND THE ENVIRONMENT: PARADIGMS OF ISOLATION AND CONVERGENGE Vakur Sümer, Ayşegül Kibaroğlu, İlhan Sağsen – TURKEY (<i>Oral</i>) |



| UNSUSTAINABILITY: THE CHALLENGE CONFRONTING "MIDDLE EASTERNERS" Aharon Klieman – ISRAEL (<i>Oral</i>) |
|--|
| MT-16: LITERATURE AND ENVIRONMENTAL AWARENESS |
| SUSTAINABLE COMMUNITIES: PRESCRIPTIONS AND ILLUSIONS Nader Yehia, Mohamed Azab – BAHRAIN (<i>Oral</i>) |
| ECOLOGICAL ROMANTCISM IN BRITISH LITERATURE Nurdan Atamturk – TURKEY (<i>Oral</i>) |
| TONGUES IN TREES: SHAKESPEARE AND THE ENVIRONMENT Himmet Umunç – TURKEY (<i>Oral</i>) |
| ENVIRONMENT EFFECTS ON THE ARCHIVE PAPERS Öznur Özden – TURKEY (<i>Oral</i>) |
| READER RESPONSE THEORY AND ENVIRONMENTAL AWARENESS Alev Baysal – TURKEY (<i>Oral</i>) |
| ENVIRONMENTALISM VS. COLONIALISM Fatma Kalpaklı – TURKEY (<i>Oral</i>) |
| MT-17: NATURAL AND MAN-MADE DISASTERS: EMERGING LINK AND CHALLENGES |
| EFFECTS OF THE LANDSLIDES ON THE ENVIRONMENT: SOME TYPICAL LANDSLIDE EXAMPLES FROM TURKEY Aziz Ertunç – TURKEY (Invited) |
| APPLICATION OF SHEET CRACK THEORY IN ANALYZING THE MECHANICS OF MOUZHUDONG LANDSLIDE Fu He-lin, Zhou Ning, Luo Qiang, Guo Jian-feng – CHINA (<i>Oral</i>) |
| PARTICIPATION AS AN ELEMENT OF SUSTAINABILITY I.N POST-DISASTER SETTLEMENTS Berna Baradan – TURKEY (<i>Oral</i>) |
| SPATIAL ANALYSIS OF EARTHQUAKE EPICENTERS IN; NORTH-WEST OF ANKARA Gulcan Sarp, S.Duzgun, V.Toprak – TURKEY (<i>Oral</i>) |
| A MANMADE DISASTER ALONG THE BLACK SEA COST: TURKEY Ilyas Yılmazer, Özgür Yılmazer, Özlem Yılmazer, Coşkun Bulut, Levent Akduman – TURKEY (<i>Oral)</i> |
| FLOOD HAZARD ZONING USING MATHEMATICAL MODEL AND GIS (A CASE STUDY JAJROOD RIVER TEHRAN PROVINCE) H.Abghari, M.Mohseni Saravi, M.Mahdavi, H.Ahmadi – IRAN (<i>Oral</i>) |
| AN ENVIROMENTAL AND ARCHITECTURAL APPROACH FOR USING EXTERNAL STRENGTHENING METHOD ON REINFORCED CONCERETE BUILDINGS IN TURKEY M.Yaşar Kaltakcı, M.Hakan Arslan, U.S.Yılmaz, H.Derya Arslan – TURKEY (<i>Oral</i>) |
| SOIL SUSTAINABLE – AS A FUNCTION OF ITS ECOLOGICAL AND TECHNICAL WAY OF USE Husnija Resulović, Esad Bukalo – BOSNIA AND HERZEGOVINA (<i>Oral</i>) |
| PROBLEM NATURAL AND MAN-MADE DISASTERS ON REGIONAL AND GLOBAL SCALES Gregory Koff, Irina Chesnokova –RUSSIA (<i>Oral</i>) |



| THE RISK-SOCIETY; "THE EFFECTS OF NATURAL AND MAN-MADE DISASTERS ON URBAN PEOPLE AND URBAN SOCIETY", THE EXPERIENCE OF THE 1999 MARMARA EARTHQUAKE İsmail Gündüz – TURKEY (<i>Oral</i>) | . 4677 |
|---|--------|
| SOLID WASTE MANAGEMENT AFTER OCTOBER 2005 EARTHQUAKE IN PAKISTAN Azhar Ali – PAKISTAN (<i>Oral</i>) | . 4689 |
| NATURAL OR MANMADE DISASTER? THE CASE OF FLOODS IN MUMBAI CITY Janki Andharia –INDIA (<i>Oral</i>) | . 4695 |
| THE THREAT OF THE OIL POLLUTION INCIDENT OCCURRED IN LEBANON TO THE NORTHERN CYPRUS COASTS AND THE IMPORTANCE OF OPERATIONAL SATELLITE MONITORING SYSTEM Filiz Sunar, Ayda Akkartal, Barış Göral, Z. Damla Uça Avci –TURKEY (<i>Oral</i>) | .4709 |
| A STUDY ON THE AFTERSHOCK SEQUENCES OF EARTHQUAKES OCCURRED IN TURKEY Serkan Öztürk, Yusuf Bayrak – TURKEY (<i>Oral</i>) | . 4719 |
| LANDSLIDES: AN ENVIRONMENTAL DISASTER IN NORTHERN IRANIAN FOREST ECOSYSTEM Seyed Hamidreza Sadeghi – IRAN (<i>Oral</i>) | . 4727 |
| MAN'S ATTITUDE TOWARD THE WORLD AND ITS ROLE IN ENVIRONMENTAL PROTECTION Qorban Elmi – IRAN (<i>Oral</i>) | 4735 |

MT-18: PESTICIDES IN THE ENVIRONMENT AND FOOD COMMODITIES

| THE EFFECTS OF SOME PESTICIDES ON VERTICILLIUM LECANII (ZIMMERMAN) VIÉGAS Sebahat K. Ozman-Sullivan, Heval Ocal, Melih Micik – TURKEY (<i>Oral</i>) |
|---|
| ENVIRONMENTAL GOVERNANCE FOR SUSTAINABLE AGRICULTURE WITH SPECIAL REFERANCE TO PUBLIC HEALTH: A CRITICAL REVIEW Anjum Suhail, Muhammad Arshad– PAKISTAN (<i>Oral</i>) |
| MONITORING OF CHLORINATED HYDROCARBON POLLUTION OF ENVIRONMENT AND ANIMALS IN ALBANIA J. Abeshi, L. Dhaskali, B. Bizhga, L. Tafaj, E. Dimco – ALBANIA (<i>Oral</i>) |
| MAIN ASPECTS OF RAW MILKS' QUALITY ORIGINALITY AND SAFETY IN ALBANIA Laura Shabani, Tania Floqi – ALBANIA (<i>Oral</i>) |
| THE PESTICIDES SORPTION FROM WATER SOLUTION BY ARMENIAN NATURAL ZEOLITES G.Torosyan, S.Harutyunyan, V.Davtyan, A.Mikaelyan, D.Hovhannisyan – REPUBLIC OF ARMENIA (<i>Oral</i>) |
| HISTOLOGICAL AND BIOCHEMICAL EFFECTS OF INSECTICIDES MALATHION AND ENDOSULFAN ON RAT TESTIS Nazan Deniz Koç, Figen Esin Kayhan, Gazi Contuk, Nüzhet Cenk Sesal – TURKEY (<i>Poster</i>) |
| A BEVERAGE HAVING BENEFICIAL SUBSTANCES ON HUMAN HEALTH: WINE Nilgün Göktürk Baydar, Gülcan Özkan – TURKEY (<i>Poster</i>) |


MT-19: THE ROLE OF MEDIA : PROBLEMS AND CHALLENGES

| A CONTENT STUDY ON ENVIRONMENTAL JOURNALISM WITH SPECIAL REFERENCE TO PRINT MEDIA Swathi Karamcheti – INDIA (<i>Oral</i>) | 4809 |
|--|-------|
| A RESEARCH ON EVALUATING THE NEWSPAPER PHOTOGRAPHS FROM THE POINT OF ENVIRONMENTAL CONSCIENCENESS E. Gülbuğ Erol – TURKEY (<i>Oral</i>) | .4845 |
| ENVIRONMENTAL EDUCATION VIA TV Nedim Gürses, Cosgül Yüksel– TURKEY (Oral) | 4859 |
| THE REFLECTION OF CULTURAL HERITAGE INTO THE CHARMING ENVIRONMENTAL OF MEDIA VIA ADVERTISEMENT FILMS Incilay Yurdakul – TURKEY (<i>Oral</i>) | .4867 |
| NIGERIAN MEDIA AS EARLY WARNING SIGNS IN ENVIRONMENTAL RISK REPORTING Ebenezer Adebisi Olawuyi – NIGERIA (<i>Oral</i>) | 4885 |
| ROLE OF MEDIA IN CONSERVING THE CULTURAL HERITAGE Eti Akyüz Levi – TURKEY (Oral) | 4899 |

VOLUME 10

MT-20: SEAS, ECOLOGICAL BALANCE, AND SUSTAINABLE ENVIRONMENT

| PROTECTED ECOLOGICAL AND FISHING ZONE IN THE REPUBLIC OF CROATIA AND ENVIRONMENTAL PROTECTION |
|--|
| Mira Lulić, Nives Mazur – CROATIA (Oral) |
| ECO-FRIENDLY PRAWN CULTURE WITH POKKALLI PADDY –TRADITIONAL PRACTICE FOR SUSTAINABLE COASTAL RESOURCE MANAGEMENT. |
| Joseph S. Paimpillil – INDIA (<i>Oral</i>) |
| SHORT TIME SERIES OF PHYTOPLANKTON, NUTRIENT AND CHOLOROPHYLL-A IN WINTER PERIOD IN THE DARDANELLES (ÇANAKKALE STRAIT, TURKEY) |
| Munammet Turkogiu, Yeşim Buyukaleş, Cenk Oner – TÜRKE Y (<i>Oral</i>) |
| Ferit Yakar, Fazil Çelik – TURKEY (<i>Oral</i>) |
| SENSITIVITY OF TURKISH PRECIPITATION TO SST VARIABILITY IN THE SURROUNDING SEAS Deniz Bozkurt, Ömer L. Şen – TURKEY (<i>Oral</i>) |
| CONSERVATION OF SEA TURTLE ON A NESTING BEACH IN SAN JUAN DE LOS PLANES, BAJA CALIFORNIA SUR MEXICO |
| Juan Guzmán, Karen Oceguera – MÉXICO (<i>Oral</i>) |
| MONITORING MARINE RECREATINAL WATER QUALITY IN ANTALYA BAY AND INTERANNUALY CHANGES OF MICROBIAL INDICATORS |
| Gönül Tugrul-Icemer, Ceren Keles, Hüseyin Karaca – TURKEY (<i>Oral</i>) |
| FUTURE BERTH REQUIREMENTS FOR SUSTAINABILITY OF IZMIR CONTAINER PORT SERVICES Adem Eren, Umit Gokkus – TURKEY (<i>Oral</i>) |
| SOLID WASTE MANAGEMENT AFTER OCTOBER 2005 EARTHQUAKE IN PAKISTAN Azhar Ali – PAKISTAN (<i>Oral</i>) |



| OCEAN POLLUTION AS A RESULT OF OFFSHORE AND ONSHORE PETROLEUM ACTIVITIES IN THE AFRICAN GULF OF GUINEA REGION |
|--|
| Babagana Abubakar – NIGERIA (Oral) |
| COASTAL ZONE MANAGEMENT AND VULNERABILITY STUDY OF A SMALL ISLAND STATE - MAURITIUS Roshan T. Ramessur – REPUBLIC OF MAURITIUS (<i>Oral</i>) |
| 502 MODIEIED SHADE DAD AMETED EOD DEDDESENITING EOLIII IRDILIM REACH DDOEILES |
| Umut Türker, M. Sedat Kabdaslı – NORTHERN CYPRUS, TURKEY (<i>Oral</i>) |
| |
| MEDITERRANEAN ENDEMIC DECAPOD CRUSTACEANS IN THE TURKISH SEAS |
| A.Suat Ateş, Tuncer Katağan, Ahmet Kocataş – TURKEY (<i>Poster</i>) 505 |
| FEEDING ACTIVITY OF THE HOLLOWSNOUT GRENADIER, CAELORINCHUS CAELORHINCUS (RISSO, 1810) IN THE AEGEAN SEA |
| Halit Filiz, Tuncay M. Sever, Bahar Bayhan, Ertan Taskavak, Gökçen Bilge – TURKEY (Poster) |
| INVESTIGATION OF MICROBIOLOGICAL POLLUTION OF SEA WATER IN MERSIN Mustafa Özyurt , Ece Ümmü Deveci, Ahmet Acar, Hakan Aygün, Bahar Tank , İrfan Sayan, Veysi Özel – TURKEY (<i>Poster</i>) |
| COASTAL ZONE MANAGEMENT |
| Sibel Aslan, Nusret Şekerdağ – TURKEY (Poster) |
| CONTAINER FORECASTING TO MACRO AND MICRO PROJECTION FOR FUTURE DEVELOPMENT AT PORT OF |
| Umit Gökkuş, Emine Budak – TURKEY (Poster) |
| |
| FUTURE STORAGE AREA REQUIREMENTS FOR SUSTAINABILITY OF IZMIR CONTAINER PORT |
| Dogan Canivar, Umit Gokkuş, Adem Eren – IUKKEY (<i>Poster</i>) |
| PRELIMINARY STUDY ON THE NORTH-AEGEAN CONTAINER PORT DEVELOPMENT |
| Umit Gökkuş, Adem Eren, Berra Gultekin Sinir – TURKEY (Poster) |

MT-21: SOCIAL AND PSYCHOLOGICAL DIMENSIONS OF ENVIRONMENTAL ISSUES

| HUMAN RESOURCE DEVELOPMENT STRATEGY FOR OIL SECTOR IN LIBYA Bouazzi, Nagia, Hussein Lahmar, S.P.Bindra – LIBYA (<i>Oral</i>) |
|---|
| PUBLIC ENVIRONMENTAL ATTITUDES IN TURKEY Muammer Tuna – TURKEY (<i>Oral</i>) |
| SUSTAINABLE BIODIVERSITY CONSERVATION IN THE NIGER DELTA: A PRACTICAL APPROACH TO CONSERVATION SITE SELECTION P. O. Phil-Eze, I. C. Okoro – NIGERIA (<i>Oral</i>) |
| RELIGIOUS AND SECULARIST VIEWS OF THE ENVIRONMENT: GOD, HUMANITY AND NATURE IN SOCIOLOGICAL PERSPECTIVE M. Ali Kirman – TURKEY (<i>Oral</i>) |
| RELIGIONS AND ENVIRONMENT: THE PRACTICE OF MORAL APPROACH TO NATURE IN TURKISH CULTURAL HISTORY H. Ezber Bodur – TURKEY (<i>Oral</i>) |
| A RAPIDLY RISING TREND: DESIGNING FOR 'HEALTHY' HEALTHCARE BUILDINGS Aslı Sungur Ergenoglu, Ayfer Aytug – TURKEY (<i>Oral</i>) |



| ASSESSMENT OF BEHAVIOUR AND ATTITUTES OF RURAL PEOPLE TOWARDS ENVIRONMENTAL ISSUES: A CASE OF TURKEY Hasan Akca, Kemal Esengun,Metin Can – TURKEY (<i>Oral</i>) |
|---|
| RANGELANDS OF BALOCHISTAN IN GLOBAL PERSPECTIVE OF CLIMATE CHANGE AND INTERNATIONAL INSTITUTIONS: SINCE 1990. Jabeen Musarrat – PAKISTAN (<i>Oral</i>) |
| AN INVESTIGATION ON OUTDOOR NOISE LEVELS IN THE TUZLA SHIPYARDS REGION IN ISTANBUL Ömer Apaydin, M. Talha Gönüllü, Yaşar Avşar – TURKEY (<i>Oral</i>) |
| DETERMINANTS OF AGRICULTURAL INTENSIFICATION IN SOUTHWEST NIGERIA A. S. Oyekale – NIGERIA (<i>Oral</i>) |
| DEVELOPMENT AND POVERTY Emel Yıldız, Ebru Z. Boyacıoğlu – TURKEY (<i>Oral</i>) |
| ALLEVIATION OF RISKS AND VULNERABILITY FACING ISOLATED COMMUNITIES THROUGH CONSERVATION AND MANAGEMENT OF BIO-DIVERSITY: THE LOWER KUISEB RIVER BASIN, NAMIBIA Josephine Phillip Msangi – NAMIBIA (<i>Oral</i>) |
| THE RELATIONSHIP BETWEEN ENVIRONMENTAL CONCERN AND SOCIO-ECONOMIC STRUCTURE Beyza Üstün, Beyza Ağcıoğlu, Zafer Yenal, Nilsun İnce, Serap Yaman, Serkan Yılmaz, İdil Alkaya, Çağrı Gökdemir – TURKEY (Oral) |
| IMPACT OF NATURAL FACTORS ON THE PSYCHO-SOCIAL RELATIONSHIPS Myqereme Rusi, Hana Rusi – Saliu – MACEDONIA (<i>Oral</i>) |
| LIGHT POLLUTION Martin Morgan Taylor – UK (<i>Oral</i>) |
| THE IMPORTANCE OF PHYSICAL ENVIROMENT IN A CHILD GROWING H. Derya Kol Arslan – TURKEY (<i>Oral</i>) |
| THE ENVIRONMENTAL JUSTICE APPROACH AS BASIS FOR POLITICAL SOCIO-ENVIRONMENTAL CHANGE IN IMPLEMENTING SUSTAINABILITY STRATEGIC POLICY Carmit Lubanov – ISRAEL (<i>Oral</i>) |
| COMMUNICATION AND EDUCATIONAL APPROACHES AND STRATEGIES FOR FOREST MANAGEMENT: A NIGERIAN PERSPECTIVE E.O. Soola – NIGERIA (<i>Oral</i>) |
| ENVIRONMENTAL SECURITY: ECOLOGY OR INTERNATIONAL RELATIONS? Mayor John Willimas, Obasohan Queen – NIGERIA (<i>Oral</i>) |
| ELDERLY ROLES IN THE ENVIRONMENTAL DESIGN OF REST HOMES Demet Aykal, Derya Cakir Aydın – TURKEY (<i>Oral</i>) |
| RESTRICTIONS IN DAILY LIVING ACTIVITIES AND SOCIAL ISOLATION STATUS OF ELDERLY LIVING IN ANKARA PROVINCE GULSEREN DISTRICT Derya Çamur, Songül Acar Vaizoğlu, Ramazan Akmeşe, Bahri Aydin, Aytan Hakan, Fikret Özgür, İlyas Tenlik, Çağatay Güler – TURKEY (<i>Oral</i>) |
| ENVIRONMENTAL RISK PERCEPTION AMONG KEÇIÖREN MUNICIPALITY WORKERS T. Gökhan Telatar, Dilek Dehmen, S. Gonca Deprem, Gülşah Eldoğan, Duygu Erdoğan, M. Nur Eroğlu, Bahar Güçiz Doğan – TURKEY (<i>Oral</i>) |



| PHYSICAL FITNESS IN RURAL CHILDREN COMPARED WITH URBAN CHILDREN IN NORTH CYPRUS Cevdet Tinazci, Nazim Burgul, Tuğra İnceer – NORTHERN CYPRUS (<i>Oral</i>) |
|---|
| PRINCIPLES OF ISLAM IN SOLVING ENVIRONMENTAL PROBLEMS Davut Aydüz, Hüseyin Akyüzoğlu – TURKEY (<i>Oral</i>) |
| IMPORTANCE OF TREE IN ISLAM Davut Aydüz, Hüseyin Akyüzoğlu – TURKEY (Oral) |
| THE BUBBLES OR THE BOILING POT? AN ECOSYSTEMIC APPROACH TO CULTURE, ENVIRONMENT AND QUALITY OF LIFE André Francisco Pilon – BRAZIL (<i>Oral</i>) |
| INDIVIDUAL AND MIXED INFLUENCE OF HEAVY METALS (COPPER AND CADMIUM) AND DETERGENT (LAS) ON ALGAE SCENEDESMUS OBLIQUUS M. Gholami, S.M.R Fatemi., M. Falahi, A. Esmaili, A. Machinchiyan– IRAN (<i>Oral</i>) |
| MEASURING THE RESIDENTS' PERCEPTIONS TOWARDS COMMUNITY APPROACH TO TOURISM PLANNING: THE CASE OF FAMAGUSTA IN NORTH CYPRUS Hale Özgit, Nesrin Menemenci, Aytaç Yıldırım – NORTHERN CYPRUS (<i>Oral</i>) |
| THE IMPORTANCE OF ENVIRONMENTAL MASTER PLANS: A SOCIOLOGICAL APPROACH Suavi Tuncay, A.Bülent Göksel, Carol Yürür, H. Ece Salalı – TURKEY (<i>Oral</i>) |
| PREDICTING URBAN GROWTH IN HOUSTON-GALVESTON-BRAZORIA CONSOLIDATED METROPOLITAN STATISTICAL AREA (HOUSTON CMSA) Hakan Oguz – TURKEY (<i>Oral</i>) |
| ESTABLISHING HEAVEN UPON EARTH: THE GREAT RESPONSIBILITY OF RELIGIOUS LEADERS AND MOVEMENTS Maryam Salek Zamani, Ali Salek Zamani, Yaghoub Salek Zamani – AZARBAIJAN (<i>Poster</i>) |

PROCEEDINGS Edited by Prof.Dr. Hüseyin Gökçekuş

Papers & Posters

VOLUME 4



International Conference on 19-24 February 2007 Nicosia-Turkish Republic of Northern Cyprus Environment: Survival and Sustainability Organized by NEAR EAST UNIVERSITY

PROCEEDINGS Edited by Prof.Dr. Hüseyin Gökçekuş

MT-4: Economics, Development and Sustainability

VOLUME 4



International Conference on 19-24 February 2007 Nicosia-Turkish Republic of Northern Cyprus Environment: Survival and Sustainability Organized by NEAR EAST UNIVERSITY



BOTTOM-UP POLICIES AND RURAL DEVELOPMENT. PEMBROKESHIRE LEADER+ EXPERIENCE

Antonio PRESTIA

Cardiff University, CARDIFF antonio.prestia@gmail.com

The paper will discuss rural development in Wales by focusing on the LEADER+ experience in Pembrokeshire. This programme has provided an opportunity to construct a "development environment" where immaterial aspects are functional to the physical operations and where participation is the most important tool to build shared projects.

In Pembrokeshire, the LEADER+ experience has provided a real opportunity for the local community to overcome the structural difficulties of the area. The innovation is in the capacity to design a project focused on the goal of building a "culture of local development" that helps communities to have faith in their capabilities and to rely upon their resources in order to generate sustainable development.

In particular, the Pembrokeshire LEADER+ development strategy is based on an innovative methodology designed to help local people to look for entrepreneurship opportunities over the widest range of activities and resources available to them.

In conclusion we will propose some lessons learnt from the LEADER+ experience in Pembrokeshire according to the shift in the rural development paradigm and its new way of thinking.

Bottom-up policy and rural development

"Rural development policy must be as decentralised as possible and based on partnership and co-operation between all levels (local, regional, national, European)". The Cork Declaration, 1996

In this socioeconomic phase globalization is a real paradox. According to Harvey, on the one hand globalization (flexible accumulation) creates a cancellation "of space through time" and it has created a "throwaway society" where volatility is dominant; on the other hand, globalization tries to create space, identity, more eternal truth, where local specificities are elements of competitiveness in the global context (Harvey 2002). In this sense, "space" plays a fundamental role, it tends to rapidly alter the localized benefits of a particular territory.

It can be said that globalization has contradictory consequence for local development, in fact it improves spatial mobilization of the capital but, at the same time, it makes capital more dependent on the local space.



Following this theory, localities become the effective spaces for competitiveness. Local development tends to produce new spaces more suited to production needs in social and economic terms. Local development tries to build localitiesⁱ, which try to create local competitive opportunities.

Governance processes and relationships among local actors (social capital) are important immaterial goods that have the nature of "collective goods" and, at the same time, they can produce "collective goods". They are considered fundamental external economies that can create new investments. Capital does not search for empty spaces to fill, but demands specificities, tacit knowledge and area conditions favorable to production. In this sense external economies are fundamental for attracting or creating a new local economic organization. A good creation of external economics depends not only on economic issues (e.g. job costing etc.) but in developed countries it is more dependent on the local governance system, on a good network of relations between public institutions and local actors, on the possibility of taking decisions together with the communities. In brief, social capital is considered an important external economy which "can favor the improvement infrastructural facilities and the efficient provision of economic and social services, as well as the influx of capital and investments of both local and external firms" (Trigilia 2001 p.429). It is fundamental to start from the territory, from its relations, from its specificities that emerge through an intensive dialogue between interest organizations, collective actors, institutions, but further, between "the inhabitants of the territory" (Magnaghi 2000). We cannot imagine local competitiveness without local cohesion.

Today the economy is more social, it is more dependent on the form of social and political regulations. According to Trigilia, "the economy becomes more relational" (Trigilia 2005 p. 153). Social capital and its possibility of creating external economies is an important *chance* for local areas and their development. Obviously, it is not a sufficient condition, we cannot forget that local development requires other important conditions such as material conditions.

However, the development of social capital in terms of involvement, openness and relations between local actors of society is an important ingredient for the complex recipe of local development. The rural development concept has been widely utilised and defined in socioeconomic studies of economic life in rural areas in these past decades. It represents local development in rural areas. In recent years rural development literature has given us (and continues to give us) different viewpoints from which to observe evolution of the concept. Now rural development is seen as one of the possible solutions to structural problems in rural areas. It is seen as a "condition of development" but improving rural development means changing the idea of development. Following the debates around this concept, rural development seems to have an important role in building and re-establishing the "environments of development". It tries, according to local development, to improve the "context capacities" and not only sectorial opportunities. Rural development tends to reoriented economic and other development activities to maximize the retention within the local territory by valorizing and exploiting local resources in material and immaterial form. Rural development is the meeting-point of endogenous and exogenous elements for development in rural areas. Through its dialectics, it has become enormously popular in integrating many different approaches to improve bottom-up development.



Rural development searches innovative ideas, new approaches oriented to assist local communities, to help them to build "new conditions of development" through the adoption of cultural, environmental and community values.

In Wales, as in other region in Europe, rural development was born during a difficult and long process of devolution in which policy decision-making was transferred from central to local level. This process was greatly helped by internal and external aspects which influenced the policies for and the strategies of rural areas. One of the external aspects was the creation of tools that helped bottom-up approach.

LEADER experience is one of these tools. LEADER Community Initiatives was introduced by European Commission in 1991 and it is an innovative approach to rural development at the local level. Yet, LEADER suggests development actions based in the valorization of indigenous resources tangible and intangible. One of the most important aims of LEADER experience is the building of social capitalⁱⁱ, new relations between local actors, the active partecipation by the public, voluntary and business sectors within the territory, to create collective goods that will help rural territories to overcome the instances of market failure which characterise rural economies.

Analytically, LEADER+ strategy (UE programming period 2000-2006) is a sustainable strategy in economic, social and environmental terms. To reduce the gap between rural areas and urban areas LEADER+ has to create sustainable solutions. Guidelines are equity, participation, environmental sustainability, respect for the local culture and at the same time the need to introduce into these areas information and communication technologies, to create new opportunities for local communities, to create a future for these contexts, to create external economies to attract exogenous opportunities. To conclude, LEADER+ is an innovative approach because it is a territorial development approach. It has a multifunctional approach. It helps communities to think about development by themselves, it constructs local capacity-building, a new system for decision-making, it is a new way of working as a system. There is the concrete emergence of social capital, vertical governance and transversal networks.

The Pembrokeshire LEADER+ experience is considered an innovative experience that tries to improve social capital as a condition for local development. Networks and improvement of the "culture of dialogue" and the "culture of entrepreneurship" are seen as important elements to create or to attract new economic activities. They are seen as an element of competitiveness. In this sense rural development becomes a complex matrix where it is important to produce public goods and where these public goods have to become local competitive advantagesⁱⁱⁱ.

Rural development is "the global interrelation between agriculture and society" (Van der Ploeg *et* al. 2000 p. 393), it is a new developmental model for the agricultural sector. It is a new definition of local powers which implicate a visible variation of local governance, the search for new relations among local actors, the search for social capital as a public good and at the same time as a condition for building public goods for competitiveness.



In this paper we will discuss the evolution of rural development in Wales and its innovations in socioeconomic issues for rural areas. We will analyze rural development in Wales as a complicated mechanism to coordinate a sustainable, durable and bottom-up development in rural areas. Rural development in Wales as a "new paradigm" which tries to utilize specificities as opportunities and weaknesses as resources. We will see the LEADER experience as a tool to build this shift. Through our case study we will try to observe integrated rural development as an element for consolidating local cohesion and, at the same time, improving competitiveness in a weak context. The challenge of rural development is to learn to see these contexts not only as weak areas but, through their potential, as strong areas. In these areas we can learn to consider development not only as economic growth but as a sustainable development in social and economic terms.

Pembrokeshire LEADER+ experience

The Pembrokeshire LEADER+ experience is one of the seven LEADER+ experiences in Wales; furthermore, Pembrokeshire is the only area that has used all three different Leader experiences in Wales. The LEADER+ experience is coordinated by PLANED^{iv} - Pembrokeshire Local Action Network for Enterprise and Development – LAG. Planed was established in 2001 and has evolved from SPARC (South Pembrokeshire Partnership for Action with Rural Communities) 1991-2001. According to Planed, "it is working throughout Pembrokeshire, building on the local community-led approach to rural development successfully developed by SPARC, in which communities, public sector and voluntary partners and special interest groups come together to undertake locally integrated development" (Planed 2004b p. 2). Planed's basic idea is to involve many local communities during policy decision-making. Working together with local communities is Planed's most important aim. In particular, Planed believes that:

- "the skills, knowledge and ideas of local people working together can address many local problems;
- by encouraging local people to take a fresh look at their own area, new and innovative solutions to local needs can be developed;
- by enabling all sections of the community to join in and by seeking to bring communities together, local people can promote projects of long-term benefit and influence policy makers;
- by building partnerships and providing access to a range of specialist support, communities can do much to improve their quality of life and well being" (Planed 2004b p. 4).

These four different points synthesize the importance that Planed gives to the participation and partnership process. These are considered as a pre-condition for improving quality of life socially, culturally, environmentally and economically. The Planed LEADER+ experience is oriented to improving the participation process together with other tools engaged by Planed.

The Planed partnership is very old in terms of construction and exercise. In fact, since the 1970s in Pembrokeshire there have been local initiatives (unusual for a small rural community) which, little by little, have helped to give confidence to local people in their own abilities to identify needs and propose some possible solutions.



In 1986 TCRI (Taf and Cleddau Rural Initiative)^v was established as the first community-led partnership in rural Wales bringing together representatives of local communities, communities of interest (business, tourism, agriculture), local authorities and funding and advisory partners including WDA, CCW, West Wales TEC and Pembrokeshire Coast National Park. This effective and acclaimed partnership model was further developed by SPARC through LEADER I and II. At the end of 2000, working with communities and partners, SPARC reviewed the effectiveness of the partnership and its way of working. The key issues for public consultation were how the organisation could remain community-led but also cover the much wider geographic area of Pembrokeshire. As a result of this consultation process, Planed was formed in 2001. LEADER+ is very innovative and sophisticated in partnership terms.

Its role is as an engager, a facilitator, a networker, a connector, an integrator, an innovator and a builder of local opportunities and community involvement. Organisation of the Planed Boards is fairly complex. There is a main Board called *Planed Board* and some sub-Boards. These boards operate and network at different levels, as a whole and sectorially, through an interactive process. *The Planed Board* is the element that drives all the partnerships, the Board members consist of: representatives of communities, special interest groups - Tourism, Business and Farming; Public Sector and Development Agencies - Pembrokeshire County Council (PCC), Pembrokeshire Coast National Park Authority (PCNPA), Welsh Development Agency (WDA), Education Learning Wales (ELWa), Pembrokeshire College, and the voluntary sector including arts and environmental organisations. The Countryside Council for Wales (CCW) and Pembrokeshire Association of Voluntary Services, (PAVS) are observers.

At first, it may seem that the size of the board could be a problem for definition of the policies and could decelerate the entire process. According to Planed, however, "the size of such an inclusive Board is a benefit and not a hindrance to effective partnership working, the aim being that all of the individuals and organisations on the Board play a key role in supporting local communities and networking with key partners to develop and implement Board policies" (Planed 2004b p. 7).

Entrepreneurship Sub-Board is supporting the LEADER+ initiative whose members include PCC, WDA, ELWa, Pembrokeshire Business Initiative (PBI), Jobcentre Plus, Business in the Community (BITC), Pembrokeshire College, Chwarae Teg, together with community, arts, environment, business, tourism and farming interests.

Bio-diversity/Sustainable Development Sub-Board ensures that key organisations with an environmental and heritage remit, committed to supporting community participation in environmental/bio-diversity and sustainable development activities, work together with Planed to encourage and facilitate grass-roots understanding and projects. A key role of the sub-board is to ensure that the principles of sustainable development underpin all of the PLANED activities and that there are close links with the Local Bio-diversity partnership, and the Coastal and River Forums. *Pembrokeshire Enterprise Network*, the Entrepreneurship Sub-Board has established and provides the Secretariat for the Pembrokeshire Enterprise Network which consists of local and regional organisations that are involved or interested in supporting enterprise activity in Pembrokeshire, with the aim of making the support for entrepreneurship development in the County more effective.



To conclude, Planed boards and their specificities are the most important resource for local development in Pembrokeshire. Besides these boards, to implement Leader initiative and other activities, Planed has other tools to improve local openness. According to the Planed Strategic Development Plan 2004-2006, *Community Forums and Community Action Plans* "local communities are being encouraged and assisted to form Community Forums, open to all local organisations and individuals, and special efforts will be made to involve socially excluded groups. The Forums identify local needs, opportunities, and priorities, which are set out in Community Action Plans, and on local representation on Area Development Groups" (Planed 2004b p. 8); *Area Development Groups* (see LEADER+ activities description); *Community Regeneration Tool Kit*: close co-operation with the WDA is being further developed to ensure that its work complements, utilises and develops the Agency's "Community Regeneration Tool Kit" strategy which is to "enable a flexible approach to work with, and through, integrated partnership at a regional and local level, so that priorities are agreed, all possible resources are mobilized and commitment is enhanced." (Planed 2004b p. 8).

The Planed LEADER+ theme is Creating a Community Culture of Entrepreneurship^{vi} and it focuses on developing and implementing an innovative methodology which is designed to help develop a change in the thinking of local people so that looking for entrepreneurship opportunities over the widest range of activities and resources becomes part of the way of life (Planed 2004b p. 14). Creating a Community Culture of Entrepreneurship is seen as an economic need for the Pembrokeshire area. According to Planed operators, the Planed LEADER+ experience is another piece of the great puzzle they aim to build in Pembrokeshire based on openness, participation and involvement of local communities to understand what opportunities exist for the development of the whole county area. In particular, according to the Rural Community Action^{vii} and the Planed Objective 1 project^{viii}, the LEADER+ strategy "provides an additional layer to this work, bringing communities together on an area and thematic basis to look specifically at identifying actions that will add value to existing resources and deliver economic benefits" (Planed 2004b p. 15). The overall aim of the initiative is to strengthen the local economy by helping communities to identify new enterprise opportunities based on local resources - the people, their natural and cultural heritage and social and economic needs.

The LEADER+ actions, more in general, are oriented towards the assistance of local communities through these four main important objectives:

- "more effective, empowered and self-confident communities involved in local affairs with local needs identified and addressed;
- assist communities to unlock talents, knowledge and skills;
- facilitate the development of enterprise opportunities based on local resource human, natural, cultural, social and economic;
- more inclusive local communities with a greater sense of community and local pride;
- a wider range of people involved in community action and local issues;
- increased provision and access to community facilities/services;
- development of greater appreciation, understanding and knowledge of the countryside, farming and rural issues"

- .



- The LEADER+ project is divided into five different actions: a. Plugging the Leaks; b. Irrigating the Desert; c. Economic Gardening; d. Pembrokeshire Enterprise Network; e.
- Area Entrepreneurship Action Plans:

Plugging the Leaks, "minimising the leakage of money from the local economy by maximising the production of goods and services locally is only a good intention unless local people have a deep understanding of the nature and full implications of the extent of the leakage and the actions they can individually and collectively take to minimise the drain on the local economy, and the benefits of doing so. *Plugging the Leaks* workshops have been adapted from a model developed originally by the New Economics Foundation and provide a participative and enjoyable way for local people to develop an understanding of their local area economy." Planed (2004c).Furthermore, the idea is "through a series of facilitated activities, working individually and in groups, people identify the main flows of money both into and out of their local area economy, and start to develop leak-plugging ideas, which are grouped into themes on a plug tree" (Planed 2004c). *Economic Gardening*, "this is an approach that makes the assumption that, by nurturing a climate in which enterprise can thrive, identifying and developing new economic opportunities will become second nature to them. *Irrigating the Desert* is an integral part of this process, which helps local people to identify and maximise local resources and opportunities, and adds value to existing activity.

Once opportunities have been identified, PLANED continues to work to support the local group in developing and implementing projects, committing funding into the activities where appropriate and helping to secure funding from other sources" (Planed 2004c). *Irrigating the Desert,* "this activity relates to a tool that has proved to be extremely useful in identifying opportunities for adding value in the process of *Economic Gardening*. Working around a single theme - a project idea, the aim is to irrigate the desert - in other words, maximise the benefit of the single income stream so that it has the optimum effect on the local area economy. *Irrigating the Desert* has been highly effective in encouraging creative thinking and in developing linkages that might otherwise have been missed" (Planed 2004c).

Area Development Plans, "following on from the *Plugging the Leaks* workshops, partner organisations are invited to work with local people, to further develop the broad themes identified during the initial consultation. Smaller working groups on specialist topics work ideas up into specific action points to be incorporated in an area Development plan. Once published, the Plan is continually updated by interrogating every local need, opportunity and resource - social, cultural, environmental, economic - to identify enterprise opportunities. Working under the terms of its Constitution, the Area Development Group is responsible for taking forward the actions contained in the Plan, supported by Planed" (Planed 2004c).

Pembrokeshire area is divided in 15 sub-areas with each sub-area containing an Area Development Group. It is a partnership where everybody can participate. It has to prepare an Area Development Plan called *Entrepreneurship Action Plan* that identifies the priorities, the opportunities and the needs of the local context. This action is very important to lower the decision-making dimension and for involvement in the first phase of the LEADER+ project of all the Pembrokeshire local communities.



Pembrokeshire Enterprise Network, "this Network was established and facilitated by Planed under the first phase of the LEADER+ project and brings together some 40 organisations involved in encouraging, supporting and developing entrepreneurship within Pembrokeshire. In the second phase of the business plan, this Network will be used as a forum for capacity building and collaborative working, with a view to developing joint projects to meet identified needs" (Planed 2004c).

To sum up, the Planed LEADER+ experience completes the local rural development proposed by Planed and aims to help local communities to make good use of their local resources and to believe in themselves as a resource. The LEADER+ experience tries to encourage the abilities of local communities and it tries to change people's way of thinking with regard to development. Like the Planed operators, we believe that the LEADER+ approach in Pembrokeshire is a real bottom-up approach because "it starts and evolves" an effective dialogue with local communities.

To conclude, the Planed LEADER+ strategic approach is very interesting in terms of participation and involvement of local communities. It is not a traditional project that aims to create material conditions for production. The Planed LEADER+ experience is more complex, "it is a piece of a big puzzle" where the general aim is to create cultural conditions for local development. This experience aims to fortify the importance of "staying together and deciding together" and of "staying together to know together".

These aspects are important to strengthen local cohesion and to help local context and communities to become more competitive. In this project physical intervention is not as important as creating a "project atmosphere", a "culture of local development". Another important element is the attention to spatial dimension of the choices in terms of knowledge of the real potential of the context. Environment, society, traditions, economy and local culture are working elements to improve the specificity and the attractiveness of the context. The importance of localities in terms of production of specificities (material and immaterial) is a prerogative for rural development that aims to build the right road to maximize local competitive advantages. These opportunities considered as local collective competitive goods are today more important in their immaterial form than in their material form (Pichierri 2005). Rural development can also help these immaterial productions. Through LEADER+ actions Planed aims to create an entrepreneurship culture fundamental for durable development in Pembrokeshire. Sustainable development, attention to the different local identities are just some important concepts in the projects. The Planed LEADER+ aims to help and assist local communities to identify their own opportunities, capabilities and skills. The idea is "to rediscover local specificities" and to build local development around them.

The Planed LEADER+ experience is coherent with the other activities for local development implementing in Pembrokeshire and, according to the EU and national strategies for rural territories, is one of the possible solutions to part of the structural social problems of the areas. Its way of thinking could help local communities to have more confidence in their territory and in their skills to improve territorial specificities.

We believe that the idea of creating a "culture of entrepreneurship" is very different from other projects which, on the contrary, are more oriented to creating physical conditions for development. Through Planed actions local communities are encouraged to take real decisions



about what they can do. At the same time the Planed approach builds and fortifies relations between local actors. It is a *continuum* in terms of social capital construction. Planed focuses its attention on the importance of creating a local system where relations and knowledge could be the real condition for development. Finally, it is important to underline that the innovation of the project is the simple approach to the communities according to other Planed initiatives. The effectiveness of the workshops exercise is very important in terms of dialogue with people or groups. Through workshops people can learn and recognise what they are able to do and, furthermore, workshops develop close working relationships between all organisations whose activities impinge on sustainable enterprise development.

Some conclusions

This review has illustrated the rapid "downward shift" of rural development policies.. The localities are seen as "cores of activities". They emerge from the mix, from the fusion, of technical-organizational capacities and socio-cultural conditions. The territorial policies are "bottom-up policies" because they aim to build development starting from the territory. According to Osti the bottom-up method is based on two principles "decision should be taken by bodies located as close as possible to the areas of interaction (subsidiarity principle); and the hierarchy of decision-making functions should be replaced by negotiating mechanism which theoretically involve all bodies on an equal footing (partnership principle)" (Osti 2000 p.172). Bottom-up policies aim to programme integrated actions that can help local potential to emerge. In Wales rural development tries to improve local abilities in conjunction with regional strategies as a multilevel cohesion. Each area is seen as a constellation of opportunities (in socioeconomic terms) and rural development tries to increase these opportunities. In this sense, the LEADER+ experience, according to Ray, is a "laboratory of rural development" (Ray 2000 p. 165). Using this metaphor we can imagine each territory as a thinker of its development, each LAG as a researcher of ideas oriented to increasing local economy. We see the Planed LEADER+ experience as an endogenous and innovative experience that tries to build regional strategies out of local actions^{ix}. It focuses on the importance of the immaterial aspect as a condition for local development. Through the LEADER+ experience, Planed tries to give local communities different viewpoints from which to observe local development. Some lessons can be learnt from the Planed LEADER+ experience:

- First of all, the single actions of the project are a real linkage between "system actions" and "the development of opportunities in the territory". There is a fusion between conditions for development and technical aspects (What can I do?). Planed, its partnership levels and workshops are conditions for this meeting.
- There is an excellent level of openness, participation, in the whole of the policy period. There are relations between people, groups or institutions. We have seen that networks are an important ingredient for integrated rural development (Murdoch 2000). According to Coleman (1990) we know that social capital could create not only positive aspects for the development of the area (as external economy etc.) but also negative conditions (e.g. collusive partnerships, opportunistic behaviours etc.) but at the same time, using two of Trigilia's categories, in the Planed LEADER+ approach there is a fusion between "construction of social capital for membership"^x and "construction of social capital for experimentation"^{xi}. This fusion is evident in the exercise of partnership process.



- There are more layers of partnership building in recent years and there is a simple bottomup approach that involves local communities and people in definition of the actions. In Pembrokeshire, partnership is not an old tradition (only in the *Cymdeithas Cleddau Ddu Area* was there a partnership tradition among local institutions, see Planed 2003), it was invented some decades ago. It is not an institutional practice with the same individual or elected people. Each person or group can and has to take part in the board (for example the Area Development Group) and each board is represented in the main Planed Board. In Pembrokeshire, different boards are connected, and each board is closely bound to the territory. In each board there are special interest groups and private and public organizations and institutions, but ordinary citizens also take part (represented in the main board by representatives of the communities).
- Planed attention is more oriented to immaterial aspects than to material ones. It is important to encourage people, to change their way of thinking with regard to development, to create a "culture of local development" as a bottom-up condition. Through more layers of partnerships and many actors in the partnerships, it is possible to create a culture of "staying together" that is one of the most important elements for local development. The Planed LEADER+ strategy is oriented to creating these conditions that could be used as a resource to create material conditions for development.
- The idea that the individual project actions are immaterial strategies and will create material initiatives only in a second phase is interesting. Local competitive advantages are not only material but, today, according to Pichierri (2005), primarily immaterial.
- Communities are seen as "inhabitants of the territory" (Magnaghi 2000). They are the lifeblood of the strategy. They are the thinkers of their development. It is in this, in our opinion, that Planed is a real best practice. The Planed LEADER+ innovation looks at development with new eyes, it is the desire to give communities new dimensional horizons for the development of their territories.
- Coherence and selectivity in terms of action integration and continuity with other initiatives existing territorially. We have talked about the linkage between LEADER+ experience with Pembrokeshire Community Action Strategy and Single Programming document Objective 1. Pembrokeshire LEADER+ completes *Pembrokeshire Sustainable Tourism Development^{xii}*, *The Planed approach to supporting sustainable agriculture^{xiii}*, *Supporting local community activities to improve their quality of life^{xiv}*, *Valuating the environment^{xv}*, *Encouraging local enterprise^{xvi}*, and other sectorial (and non-sectorial) strategies implemented in Pembrokeshire. LEADER+ is another important strategy that completes the puzzle that Planed aims to create in Pembrokeshire. Integration is fundamental.
- Planed LEADER+ is not only an endogenous approach but, through endogenous potential, it tries to connect Pembrokeshire with exogenous opportunities. Pembrokeshire LEADER+ creates this condition through the building of a local environment where the "local system"^{xvii} provides the linkage with external possibilities. Local development is not localism hence the creation of the context in moral, cultural and institutional terms in the local development approach is a great resource. This does not mean, however, that localities have to be closed in themselves. On the contrary, according to Van der Ploeg^{xviii}, it means that local systems must respond to external challenges. This ability was born



through endogenous potential and through the capacity to create an environment favourable to external initiatives. Local development is the fusion of these two aspects. Territory, in this vision, is *glocal* (Magnaghi 2000), "thinking locally behaving globally". According to Van der Ploeg *et* al. "it is the complex institutional setting of rural development that makes it a *multi-actor process*. The drive towards a decentralized rural policy approach in which locality and the newly emerging relations between the local and global are major design principles may serve to strengthen the process" (Van der Ploeg *et* al. p. 394). Planed tries to create immaterial conditions to build or to attract material actions. Creating a Community Culture of Entrepreneurship recognises that the greatest resource of the area is its people, their skills, knowledge, enthusiasm and commitment and then material aspects (like environmental quality, local culture, local productions, local economic resources etc). Starting from this consideration, we can imagine a linkage between internal and external factors as the conditions for local development.

- There is a meeting between bottom-up and top-down policies. It is evident in the coherence in partnership and local governance terms with the regional strategies we have seen in the previous pages. There is coherence in terms of environmental, social and economic policies, thinking by regional apparatus but implemented by local actions and programmes. References to different documents are present in the Planed LEADER+ strategies.
- The Planed LEADER+ approach is a cohesion policy and, at the same time, a competitiveness initiative. Cohesion does not exist without competitiveness and, at the same time, competitiveness does not exist without cohesion. Pembrokeshire LEADER+ tries to conjugate these two functional aspects in its strategy. Participation, involvement, partnership are cohesion, their application is competitiveness. Workshops are the meeting point between cohesion elements and competitiveness strategies. Planed LEADER+ experience is a best practice because it tries to mix aspects linked with competitiveness and cohesion at a territorial level according to a European social model. It aims to link economic development with social cohesion.
- The Planed LEADER+ approach is just a part of a wide-ranging project for local development in Pembrokeshire. We need to imagine it as a further possibility, as a further integrated action to develop this area. It is impossible to consider Planed LEADER+ as an end in itself. According to Planed operators, it is a "piece of a great puzzle", it is "another layer" in the integrated strategy for Pembrokeshire. Continuity is evident, which is very important for local development issues.
- The Pembrokeshire LEADER+ theme (Creating a Community Culture of Entrepreneurship) is a cultural approach to improve economic sustainable development in Pembrokeshire. Developing this way of thinking is the root of durable development. The LEADER+ in Pembrokeshire is not a quick answer to the structural problems of the area, but it is a starting point for building a new approach to local rural development. "Leader-inspired identity construction [that] can be used to develop *culture economies*" (Lee *et* al. 2005 p. 273). It enables us to see immaterial aspects as a condition for material actions for development.



To conclude, in this review we have seen the evolution of rural policy in Wales and the importance that it has in terms of competitiveness of each area. The LEADER initiative has introduced an innovation in our way of thinking as regards territorial policies, its attention is focused on the context rather than on the sector. The case study confirms that bottom-up approach for rural development is offering new opportunities for local dynamic forces in areas mainly characterized by economic and social disadvantages. The LEADER+ tries to create external economies in rural areas, and we know that this production, especially for rural areas, is the "lifeblood" of the local development. Planed and its experience tries to produce external economies in an immaterial form. We can observe Pembrokeshire LEADER+ as an innovative good practice that opens our eyes to other areas and outlines another possibility in the complex vision of local development matrixes.

According to Voltaire "The real voyage of discovery does not consist in searching for new lands, but in having new eyes".

REFERENCES

Bagnasco, Piselli, Pizzorno, Trigilia, (2001) Il capitale sociale. Istruzioni per l'uso, Il Mulino, BO;

- Banks J., Marsden T. (2000), *Integrating agri-environment policy, farming systems and rural development: Tir Cymen in Wales*, Sociologia Ruralis, Vol. 40, n.4, pp 466-480, Blackwell Publishers;
- Becattini G, Omedei Zorini L. (2003), *Identità locali rurali e globalizzazione*, La Questione Agraria, n.1, pp 7-30;
- Coleman J. (1990), *Fundation of Social Theory*, Harvard University Press, Cambridge, Mass. (Italian traslation) *Fondamenti di teoria sociale*, Il Mulino, BO (2005);
- Daly H. (1996), *Beyond Growth: The Economics of Sustainable Development*, Beacon Press, Boston (Italian translation) *Oltre la crescita. L'economia dello sviluppo sostenibile*, Einaudi, TO, (2001);
- Giddens A. (1984), *The construction of society: outline of the theory of structuration*, Cambridge Polity (Italian translation) *La costruzione della società*, Edizioni di comunità, MI (1984);
- Lee, Arnason, Nightingale, Shucksmith, (2005), *Networking: Social Capital and Identities in European Rural Development*, Sociologia Ruralis, Vol. 45, n.4 pp 270-283, Blackwell Publishers;
- Harvey D. (1989), *The condition of Postmodernity*, Cambridge: Basil Blackwell, (Italian traslation) *La crisi della modernità*, NET, MI, (2002);
- Magnaghi A. (2000), Il progetto locale, Bollati Boringhieri, TO;
- (2003), *Lo sviluppo locale autosostenibile. Teorie, metodi, strumenti, esperienze*, "Series of Seminars" for Doctorate of Research in "Science, Technology and Society", Department of Sociology and Political Science, University of Calabria. (the paper is available on line);

Marsden T. (2003), The condition of rural sustainability, Royal Van Gorcum, Assen;

- Marsden T., Sonnino R., *Rural development and agri-food governance in Europe: tracing the development of alternatives*, (in review);
- Murdoch J. (1992) Representing the region: Welsh farmers and the British state, in Marsden, Lowe, Whatmore, Labour and Locality. Uneven Development and the Rural Labour Process, David Fulton Publishers, London;
- (2000), *Networks a new paradigm of rural development*, Journal of Rural Studies, n.16 pp 407-419, Elsevier Science Ltd.;
- Murdoch J., Lowe P., Ward N., Marsden T. (2003), *The differentiated Countryside*, Routledge, London;
- National Assembly for Wales (2000), Rural Development Plan (RDP) 2000-2006;
- (2001), LEADER +. Single Programming Document for Wales 2000-2006;
- (2001b), Farming for the future. A new direction for farming in Wales;
- (2005), Rural Development Plan 2007-2013. The Strategy Approach, Dec. 2005, DRAFT;
- OECD (2001), Multifunctionality. Towards an analytical framework;



- Osti G. (2000), *LEADER and Partnerships: The Case of Italy*, Sociologia Ruralis, Vol. 40, n.2, pp 173-180, Blackwell Publishers;
- Pembrokeshire Partnership Management Board (2003), Objective 1 in Pembrokeshire: The local strategy 2003-2004;
- Planed (2003), North East Central Area Community Enterprise Group, *Entrepreneurship Action Plan*; (2004), *LEADER+ Business Plan 2004-2008*;
- (2004b), Strategic development Plan 2004-2006. Supporting sustainable communities;
- (2004c), Project-Plan, Creating a Community culture of Entrepreneurship;
- Ploeg, J.D van der, Renting, Brunori, Knickel, Mannion, Marsden, Roesr de, Sevilla-Guzmàn, Ventura, (2000), *Rural Development: From Practices and Policies towards Theory*, Sociologia Ruralis, Vol. 40, n.4, pp 391-408, Blackwell Publishers;
- Pichierri A. (2003), Tesi sullo sviluppo locale, Studi organizzativi, n.3, pp 69-88;
- (2005), *Lo sviluppo locale in Europa. Stato dell'arte e prospettive*, Rubettino, Soveria Mannelli. "Series of Seminars" for Doctorate of Research in "Science, Technology and Society", Department of Sociology and Political Science, University of Calabria;
- Putnam R. (1993), *Making Democracy Work*, Prinception University Press (Italian traslation) La tradizione civica nelle regioni Italiane, Mondadori, MI, (1993);
- Ray C. (2000), *The EU LEADER Programme: Rural Development Laboratory*, Sociologia Ruralis, Vol. 40, n.2, pp 163-171, Blackwell Publishers;
- The Royal Town Planning Institute (2000), Integrated Rural Strategies. Good Practice Guide;
- Trigilia, C. (2001), *Social Capital and Local Development*, European Journal of Social Theory, N. 4, (4) November, 427-442;
- Trigilia, C. (2005), Sviluppo Locale. Un progetto per l'Italia, Laterza, BA;
- Wales Rural Observatory (2004), An overview of policy and resources impacting on rural Wales, Cardiff University.

Notes

¹ Locality as "space for social interaction". Giddens in his "theory of structuration" argues that localities are the space in which human interaction takes place and that this interaction produces relational spaces (e.g. powers, sets of institutions, community relations etc.). In Giddens's structuration theory the localities are the starting-point for the social practices and, furthermore, the localities are the starting-point for the regionalization theory that defines the multilevel space of actions. For more information see Giddens (1984).

²See Lee et *al.* (2000); Osti G. (2000); Ray C. (2000); Shucksmith M. (2000), *Endogenous Development, Social Capital and Social Inclusion: Prospective from LEADER in the UK,* Sociologia Ruralis, Vol. 40, n.2, pp 208-218, Blackwell Publishers.

³Local competitive advantages as goods, productions etc. (endogenous or exogenous) that can contribute to the development of the territory in social and economic terms. For more information see Pichierri (2003, 2005).

⁴Planed also coordinates other projects in Pembrokeshire in rural regeneration, environmental economics and social themes. Projects and initiatives are sponsored by the EU, government and local government. The themes of the initiatives are oriented to environmental sustainability, new employment in sustainable agriculture, sustainable tourism development, social issues and involvement of local communities in the identification of local opportunities.

⁵The Taf and Cleddau Rural Initiative was established in 1986, with the aim of giving local people the chance of playing a significant role in assisting and developing their community in a social, environmental, economic and cultural sense. This initiative was the first in Wales to try to bring the then main development agencies - The Welsh Development Agency, The



Countryside Commission (later to be replaced with the Countryside Council for Wales, CCW), The Wales Tourist Board - together with County and District Councils, into a local partnership with the people of an area to develop strategies to address the area's needs and opportunities.

⁶It is coherent with the first Action of the LEADER+ strategy in Wales, *Improving the Quality of Life in Rural Communities* (Measure 1). It focuses on local communities. The starting point for work under this Theme is a process of community consultation. LAG develops strategies to meet the needs and aspirations of local communities based on the result of the consultation.

⁷Rural Community Action is a Welsh Assembly Government programme to empower communities and enable them to take responsibility for the regeneration of their area. Planed is the managing partner of the Pembrokeshire Community Action Strategy. The theme of the strategy in Pembrokeshire is *Sustainable Communities*.

⁸The theme of the project is *Supporting Communities* and it focuses on community consultation, engagement and development at individual community level.

⁹See consideration about Sparc in Shucksmith M. (2000), *Endogenous Development, Social Capital and Social Inclusion: Prospective from LEADER in the UK*, Sociologia Ruralis, Vol. 40, n.2, pp 208-218, Blackwell Publishers

¹⁰Trigilia uses this category to define strong, heavy partnerships. These partnerships can be a real example of territorial affiliation and can create a positive push in terms of policy decision-making but, at the same time, in these coalitions it is easier to observe negative aspects such as collusive coalitions. (Trigilia 2005 p. 32-34).

¹¹Trigilia uses this category, in contrast with the previous one, to define weak partnerships. Weak because they did not exist before and they have been recently created for various reasons. These coalitions are weaker than the previous ones, but at the same time it is more difficult to observe opportunistic aspects than in the previous ones (Trigilia 2005 p. 35-38).

¹²Through these projects tourism is seen as an important element for the development of the territory and, at the same time, sustainable tourism is seen as a way of maintaining local environmental resources, local traditions and local culture in general in a sustainable form.

¹³This strategy is closely linked to the LEADER+ initiative. It aims to improve sustainable actions in agriculture. Some of the main points are to increase local employment, to create new strategic local sectors in agriculture and to improve the quality of life in a rural context.

¹⁴The aim of this programme is to develop sustainable communities that can contribute in terms of participation, involvement etc. to policy decision-making and, therefore, to development of the communities themselves.

¹⁵This project is oriented to working "in and for" the environment. The main aim is to implement local, national and EU strategies in terms of sustainable development oriented also to creating new employment.

¹⁶This programme is oriented to developing new entrepreneurial activities or to assisting existing ones.

¹⁷According to Becattini, Omedei Zorini, "local system" is not only when the evolution, organization and competitiveness of a system depend on technical progress and investment, but also on institutional, cultural and moral factors of the local context (Garofoli, Mazzoni in Becattini, Omodei Zorini 2003 p. 16).

¹⁸ Van der Ploeg (1994) in Becattini, Omodei Zorini 2003 p. 17.



THE EFFECTS OF B AMENDED IRRIGATION WATERS ON COTTON YIELD AND B ACCUMULATION IN SOIL AND LEAF TISSUES

Sabri SENER¹, Fidan AKBAS²

¹Department of Agricultural Structures and Irrigation, Faculty of Agriculture, Canakkale Onsekiz Mart University, 17028, Çanakkale,Turkey ²Soil and water research Institute of Ministry of Agriculture and Rural Affairs Menemen, Izmir,Turkey sasener@comu.edu.tr

This research was carried out to determine the effects of irrigation waters with different boron concentration on cotton yield and boron accumulation in the soil and in the leaf tissues for five years. Experiment was conducted with two different types of soils; (1) loamy Menemen plain soil and (2) silty clay and silty clay loam Soke plain soils, in lysimeters. Cotton (*Gossypium hirsutum* L.) plants grown in lysimeters were irrigated with irrigation waters having 0.5, 1.0, 2.0, 4.0, 8.0, 16.0 ppm boron concentration.

Research results showed that Boron contents of soil profiles increased in both soil types in accordance with the boron content of irrigation water, but this increase was more crucial in the second and following years, with irrigation waters having 8.0 ppm and 16.0 ppm boron concentration. Similar boron accumulation trend was observed on leaf tissues of cotton during the five experimental years. The cotton lint yields decreased by the years in plots irrigated with 8.0 and 16.0 ppm B-amended waters, but more reduction in cotton lint yield was observed in Menemen plain loamy soils than in the Soke plain silty-clay soils. This was partly because of rather heavy texture, the high CaCO₃ and clay content of the Soke plain soils which might have affected Boron absorption of the cotton plants.

Key Words: Cotton; Gossypium hirsutum L.; Boron; irrigation ; soil; yield

1. Introduction

Boron occurs most frequently in nature as borates and boric acid, never as free element. Its largest uses are in glass, detergents and agriculture. Essential for higher plants, but at high doses boron is toxic in animals and plants. Turkey has the largest boron reserves in the world.

Pollution of irrigation waters by toxic elements is the major problem for sustainable agricultural production. Boron is the major toxic element polluting irrigation waters in Turkey. Drainage waters containing 47 - 431 ppm boron concentration from the boron mines are discharged into the rivers without treatment which threatens more the 100 000 ha of agricultural lands irrigated from these rivers, i.e. boron concentrations ranged from 0.76 to 4.60 ppm in Simav Creek water in this region (Sener and Ozkara, 1988).



On the other hand geothermal wells, geothermal power plants and their discharge waters are another serious source of Boron pollution in surface and groundwater in Turkey and tectonic active zones of the world. Data collected more than 6,000 selected sampling points reveal that more than 10 percent of the water resources in the Mediterrenean Basin have boron levels exceeding 1 miligram per liter. The highest values of boron are in areas associated with geothermal activity (Vengosh et al., 2004). Also over use of groundwater for domestic or irrigation purposes, close to geothermal districts, causes boron pollution of the water in aquifers. Great Menderes river which is the main irrigation water source for Great Menderes Basin has been polluted by geothermal wells' discharge waters, having 40 to 50 ppm boron concentrations in Kızıldere and Germencik. Sewage waters of cities and the resudies of agricultural chemicals are another serious source of contamination for this river. Approximately 130 000 ha productive agricultural land irrigated from this river is subject to Sodium, Boron and salinity problems in this region (Ozkara and Sener, 1986). High boron levels were reported in other agricultural areas of Turkey, i.e. Igdir Plain 11.0 ppm, Konya Plain 4.4 ppm, Ankara, Murted Plain 12.0 ppm (Sonmez, 2003) and Alasehir, Gediz Plain 5.33 ppm (Konuk and Colakoglu, 1995).

Areas where high soil B are found in the world, include dry lands of South Autralia, the Middle East, the west coast of Malaysia, valleys along the southern coast of Peru, the Andes foothills in northern Chile, solonchaks and solonetz soils of USSR, ferrasols of India, rendzinas in Israel and B deposits at Searls, Lake California. The highest concentrations of soil B are often concentrated in marine evaporites and in marine argillaceous sediment (Nable et al., 1997).

Boron levels in European groundwaters were higher in Southern Europe (Italy and Spain) than in Northern Europe (Denmark, France, Germany, Netherlands and United Kingdom). For Italy and Spain mean boron concentrations ranged from 0.5 to 1.5 mg per liter. Concentrations ranged up approximately 0.5 mg per liter in the Netherlands and United Kingdom, and levels in 90 percent of samples in Denmark, France and Germany were found to be below 0.3, 0.3 and 0.1 mg boron per liter. Ground water contaminated with excessive concentration of boron from surface water recharge has been noted beneath the Kesterson Reservoir, California,USA. This reservoir serves as an evaporative sink for several metalloids, includinng boron, and receives agricultural drainage from farmlands within the San Joaquin River Valley (UNEP,1998).

The aim of this experiment was to determine the effects of irrigation water with different Boron concentrations on cotton yield and Boron accumulation in soil and leaf tissues. Cotton was selected as test crop, because it is the major crop grown and subject to boron hazard in the western and southern alluvial plains of Anatolia. Turkey is the 4th biggest cotton growing country, after Chine, India and Pakistan, with a total production of 2 997 000 bales in Asia, and 6th in the world (Smith,1995).



2. Materials and methods

2.1. Experiment sites' soils and climatic conditions

This research was carried out at the lysimeters located at the experimental field of the Soil and Water Research Institute of Rural Affairs, in Menemen, Izmir, Turkey. Location of the experimental fields lies in the western part of Turkey (38°40' N; 27°07' E) with an elevation of about 10.0 m. Lysimeters were filled up with two different soils taken from the major cotton growing alluvial plains in western Turkey, (1) Menemen Plain and (2) Soke Plain. Some physical and chemical properties of experimental soils are given in table 1.

| Soil Properties | Menemen Plain | Soke Plain |
|--------------------------------|---------------|-------------|
| Soil texture | L | SiC , SiCL |
| Salinity/sodium problems | None | None |
| pH | 7.61-7.89 | 7.42-8.11 |
| $CaCO_3$ (%) | 9.02-10.66 | 14.04-21.84 |
| Organic matters (%) | 1.69 | 2.50 |
| Field capacity (%) | 23.10 | 31.92 |
| Witting point (%) | 12.83 | 18.74 |
| ESP | 2.9-9.9 | 3.3-13.4 |
| P_2O_5 (kgha ⁻¹) | 818 | 950 |
| K_2O (kgha ⁻¹) | 976 | 850 |
| Boron (extractable) (ppm) | 0.11-0.18 | 0.01-0.29 |
| $EC (dSm^{-1})$ | 0.44-0.70 | 0.54-1.44 |

Table 1. Some physical and chemical properties of experimental soils

Typical Mediterranean climate, hot and dry in summers, mild and wet in winters, prevails in the region. Average annual rainfall is 558.7 mm, average temperature is 16.6 °C. Annual rainfall and soil temperatures of the experimental plots in July and August from 1993 to 1997 are given in table 2.

| Years 1997 | 1993 | 1994 | | 1995 | 1996 | |
|--|-----------|-------|-------|-------|-------|-------|
| Annual Rainfall (mm) | | 412.1 | 430.7 | 679.3 | 485.6 | 548.3 |
| Soil Temperature °C at 5 cm soil dept | Jul. h | 32.1 | 34.3 | 31.6 | 32.6 | 28.8 |
| in July and August | Aug. | 32.7 | 33.2 | 31.3 | 33.1 | 25.9 |

Table 2. Annual rainfall and soil temperatures in July and August from 1993 to 1997 in experimental fields. (Anon., 2002)



2.2. Experimental design and treatments

Lysimeters were built 1.20 m deep in the soil with 2.0 m in length and 1.0 m in width. Each lysimeters had a drainage system at the bottom. Each 20 cm soil layer was put in the lysimeters in the natural sequence. Lysimeters were left open (subject to winter and spring rains) after harvesting cotton. Treatments were arranged in randomized block design with three replications as two separate experiments. (I) Menemen Plain Soils, (II) Soke Plain soils. Experiment was carried out for five consecutive years from 1993 to 1997.

Irrigation waters with six different Boron concentrations (0.5, 1.0, 2.0, 4.0, 8.0 and 16.0 ppm) were used as treatments. The well water and H_3BO_3 were used for the preparation of the required concentrations. Mean chemical composition of the well water was given in table 3.

Table 3. Mean chemical composition of the well water used in the experiment

| | | | | A | nions a | nd Cati | ions (r | ne/l) | | |
|------|--------------|------|------|------|---------|-----------------|---------|-------|------------|-------|
| pН | EC | | | ~ | | ~~ ³ | | | ~ ~ | ~ . ~ |
| | (dSm^{-1}) | Na | K | Ca | Mg | CO_2 | HCO | Cl | SO_4 | SAR |
| 7.65 | 0.61 | 1.52 | 0.20 | 2.97 | 2.43 | - | 5.23 | 1.7 | 0.24 | 0.93 |

Five times 90 mm irrigation water (60 percent of the avarage water holding capacity of the 0.00- 0.90 m plant root zone) was applied at each plot for one growing season. This amount of water was adequate for cotton production without subjecting the crop any water stress, depending on the previous experiments in this region (Sener et al. 1992). A well-adapted local cotton cultivar (Nazilli-84) was used as experimental crop.

2.3. Soil water and plant analysis

Boron analysis were carried out according to colorimetric method, using carmine solution (Richards, 1954 and Tuzuner, 1990) on the soil samples taken from 0-90 cm root zone before irrigations early in May and after irrigations late in late September or in October. Five cotton plants were selected in random at each lysimeter and leaves of these plants were collected from the fruting branches (with fruiting limb sympodiums) above the ninth main stem node before harvest, after five irrigations were completed. Boron analysis on the cotton leaves were conducted according to the colorimetric method, using carmine solution given by (Richards, 1954 and Kacar, 1972).

2.4. Statistical analysis

In all experiments, data were subjected to analysis of variance using the MINITAB (Minitab for windows, ver.130) statistical package and Duncan Multiple Range Test (MSTATC statistical package) were used to determine the different groups. Analysis of variance was performed separately on boron accumulation in the soil and leaf tissues and on total cotton yields for each year.



3. Results and discussion

3.1.Boron accumulation in the soil

Boron concentration, before and after irrigation, of Menemen and Soke Plains' soils are given in figures 1 and 2 respectively. The resul of regression analysis showed that significant increase in B concentration of soils with increasing B content of irrigation water was observed in Menemen and Soke soils. While the highest B levels were 2.40 ppm and 1.53 ppm for 16 ppm irrigation water at the end of first year, B accumulation increased to 7.66 ppm and 7.78 ppm at the end of the fifth year of the experiment in Menemen and Soke plains' soils respectively for the same (16.0 ppm) irrigation water treatment. Figure 1 and figure 2 show boron accumulation in the soil profile increasing by the years. B accumulation is more significant by years in plots irrigated with 8.0 and 16.0 ppm Boron-amended waters.

Since lysimeters were fallow after cotton was harvested, there was a significiant leaching effect of the winter and spring rains after the third year of the experiment, particularly at high boron containing soils. Winter and early spring precipitation ranging from 412 to 679 mm, was quite effective in leaching about fifty percent of the B in the 0-90 cm soil profile (fig. 1, fig. 2). (i.e. Boron content of Menemen Plain soil is 5.96 ppm in October of 1996 and 3.15 ppm in May of 1997, for 16 ppm boron treatment).



Fig 1. Mean B concentration of Menemen Plain soils in lysimeters irrigated with Boronamended waters

(1) Before irrigation (2) After irrigation



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



Fig 2. Mean B concentration of Soke Plain soils in lysimeters irrigated with Boron-amended waters (1) Before irrigation (2) After irrigation

3.2.Cotton Lint Yield

Mean lint yields of cotton irrigated with waters containing different B amended waters and statistical results are given in table 4. Mean cotton lint yields (lint plus seed) ranged from 2193 kg per hectar to 4773 kg per hectar. The highest lint yields were obtained in 1995. Relatively higher annual rainfall, 679.3 mm (120 mm over the average) in this year might be effective on the higher yields (table 2).



| | | Cotton yield (kg ha ⁻¹) | | | | | |
|---------|---------------------------|-------------------------------------|--------------------------------------|--|--|--|--|
| Years | - B, in water (ppm) | Menemen soil $X \pm Sx$ | Soke soil X ± Sx | | | | |
| | 0.5 | 3570 + 58 | 3580 + 111 | | | | |
| | 1.0 | 3607 ± 137 | 3417 + 44 | | | | |
| 1993 | 2.0 | 3550 ± 173 ns | 4130 ± 130 ns | | | | |
| 1775 | 2.0 4 0 | 3743 + 165 | 3410 ± 123 | | | | |
| | 8.0 | 3719 ± 103 3510 ± 307 | 3470 ± 62 | | | | |
| | 16.0 | 3510 ± 307 3513 ± 156 | 3507 ± 176 | | | | |
| | 0.5 | 3397 + 95 | 3157 + 70 | | | | |
| | 1.0 | 3163 ± 119 ab | 3157 ± 70 3257 ± 195 | | | | |
| 1994 | 2.0 | 3103 ± 119 ab | 3237 ± 175 3313 ± 39 ns | | | | |
| 1774 | 2.0 | 3103 ± 40 ab | 3370 ± 6 | | | | |
| | 4.0 8.0 | 2983 + 86 h | 3052 ± 160 | | | | |
| | 16.0 | 2637 ± 42 c | 3032 ± 100 3217 ± 54 | | | | |
| | 0.5 | 4667 + 137 a | 4770 ± 171 a | | | | |
| | 1.0 | 4687 ± 97 a | $4/10 \pm 1/1$ a $4/40 \pm 83$ ab | | | | |
| 1995 | 2.0 | 4673 ± 132 a | 4773 + 217 a | | | | |
| 1775 | 2.0 | 4073 ± 132 a 4577 ± 32 a | 4779 ± 217 d 4340 ± 76 ab | | | | |
| | 8.0 | 4377 ± 32 a 4137 + 115 h | 4320 ± 70 do 4320 ± 70 c | | | | |
| | 16.0 | 2933 ± 43 c | 4103 ± 94 c | | | | |
| | 0.5 | 3583 + 160 a | 3507 ± 144 ab | | | | |
| | 1.0 | 3597 ± 57 a | 3640 ± 47 ab | | | | |
| 1996 | 2.0 | 3673 ± 64 a | 3643 ± 56 ab | | | | |
| - / / 0 | 4.0 | 3583 ± 73 a | 3720 ± 110 a | | | | |
| | 8.0 | 2928 ± 120 b | 3247 ± 168 b | | | | |
| | 16.0 | 2193 ± 88 c | 3250 ± 168 b | | | | |
| | 0.5 | 3893 ± 223 a | 3840 ± 183 a | | | | |
| | 1.0 | 3957 ± 55 a | 3817 ± 39 ab | | | | |
| 1997 | 2.0 | 3953 ± 41 a | 3843 ± 85 a | | | | |
| | 4.0 | 3583 ± 73 ab | 3517 ± 124 ab | | | | |
| | 8.0 | $3077\pm104~b$ | 3313 ± 135 c | | | | |
| | 16.0 | 2280 ±131 c | 3320 ± 129 c | | | | |

 Table 4. Mean yields of lint cotton irrigated with different Boron amended waters and statistical results in lysimeters

Means followed by the same letter are not significiently different (p<0.05) according to Duncan Test.



Menemen Plain soils

There was no significant difference statistically at the end of the first year on cotton lint yields grown in Menemen plain soils. Differences in cotton lint yields for 0.5, 1.0, 2.0 and 4.0 ppm B-amended water applications were not significiant statistically, in five years. Significant differences (p<0.05) were observed on cotton lint yields for 8.0 and 16.0 ppm boron treatments from the second year to the fifth year of the experiment in Menemen Plain loamy soils. Decrease in the lint yields were 11.4 percent, 18.3 percent and 20.9 percent for 8.0 ppm B-amended water application in 1995, 1996 and 1997; and 37.1 percent, 38.8 percent and 41.5 percent for 16.0 ppm B-amended water application in 1995,1996 and 1997, respectively.

Soke Plain soils

There was no significant difference on cotton yields statistically at at the end of the first and the second years in Soke Plain soils. Cotton lint yield decreased significantly (p<0.05) at 8.0 and 16.0 ppm boron treatments in Soke plain soils in 1995, 1996 and 1997. Decrease in the lint yields were 9.0 percent ,7.4 percent and 12.5 percent for 8.0 ppm B-amended water application in 1995, 1996 and 1997; and 14.0 percent, 7.3 percent and 13.5 percent for 16.0 ppm B-amended water application in1995, 1996 and 1997, respectively. But, no yield reduction was observed statistically at 0.5, 1.0, 2.0 and 4.0 ppm B-amended irigation water treatments.

Similar results were reported in California, where field grown crop in the San Joaquin Valley that have been irrigated with saline-sodic drainage water containing over 8 mg/L B, include cotton, melon, salicornia, sugar beet, tomato and wheat. Despite high levels of B in the drainage water, B toxicity has not yet been reported on annual crops (e.g cotton). At least part of the success may be attributed to the fact that many of these annual crops are tolerant of B such as cotton, sugar beet and tomato (from Maas and Grattan). An additional factor is that rainfall reduces the boron hazard (Anon., 1999).

Rhoades and Loveday (1990) reported parallel results; 6.0 to 10.0 mg/L B concentration in soil water without yield reduction as threshold for cotton. According to the same authors boron tolerances may vary depending on climate, soil conditions and crop varieties.

3.3. Boron concentration of cotton leaves

Mean B concentration of cotton leaves are given in figure 3. B content of the cotton leaves ranged from 655.0 to 2085.0 ppm for the 16.0 ppm B-amended water treatment in Menemen plain soils. These values ranged from 220.0 to 1117.0 ppm for the same treatment in Soke plain soils.

The higher $CaCO_3$ content; silty, clay and silty clay loam texture of Soke plain soils probably contributed to lower leaf tissue B concentrations. Same properties of the soils contributed to obtain rather higher cotton lint yields in Soke plain soils than Menemen plain soils by fixing B in the soil and by decreasing the B absorbing capacity of the cotton plants.



Solubility of B in the soil and subsequent availability for cotton plant uptake will also depend not only the concentration, but also other soil factors such as texture, soil pH, $CaCO_3$ content, soil moisture content and soil temperature (Kacar and Katkat, 1998). Mean B concentration of the cotton leaves increased by years especially in the plots irrigated with 8.0 and 16.0 ppm Boron-amended waters. These results agree with the previous reports Banuelos et al. (1996).

B-content of cotton leaves showed an increase from the first year onwards, but a drop in the last year, a year with much lower soil temperatures 28.8 °C in July and 25.9 °C in August, as shown in fig. 3. The reason for lower mean B concentrations of cotton leaves in both experiments than expected in 1997 may be rather lower soil temperatures that might have affected B absorption of the plants in that special year. This is in agreement with result cited by Kacar and Katkat, (1998) (from Walker, 1969).



Fig 3. Mean B concentration of cotton leaves grown in Menemen and Soke Plains' soils irrigated with Boron-amended waters



According to these authors; soil temperature effected the Boron absorption of the corn plant. When soil temperature increased from 20°C to 31°C Boron absorption of corn increased from 192 μ pot⁻¹ to 1867 μ g pot⁻¹.

Bergman (1988), stated that 20-80 ppm Boron in mature cotton leaves shows sufficient nutrient levels, but in high temperatures Boron deficiencies have been observed. Boron deficiencies limit crop yields on clay soils rich in organic matter in eastern Canada. Higher critical levels of extractable B than proposed in the literature were determined. This may be due to the large clay and ammonium oxalate contents, which increase soil B sorption capacity and decrease B intensity Simard et al. (1996). Plants absorb more B from sandy soils than heavy clay soils. Boron is fixed by the carbonates in the soil as insoluble or less soluble forms. Carbonate application to the soil increases the pH of the soil thus B absorbing capacity of the plants decreases Kacar and Katkat (1998).

A parallel result was reported by Banuelos et al. (1996), which they conducted two greenhouse studies to evaluate the growth response of kenaf and cotton to B-amended irrigation water and B-amended soils. In experiment I, both kenaf and cotton irrigated with water amended 7.5 mg B L⁻¹ as boric asid or with water containing < 0.25 mg B L⁻¹. Leaf tissue B concentrations ranged from 300 to 800 mg B kg⁻¹ for cotton. In experiment II, growing kenaf and cotton in B-amended soils reduced DM yield of kenaf and cotton 27 and 17 percent respectively. Goldberg et al. (2003) had grown melons for 95 day in two consecutive years in containers of very fine Lillis soil that had been pretreated with solutions with different B concentrations. They found that; the B treatments caused various deleterious effects on melon growth and development. Fresh and dry plant matter decreased significantly with increasing B. These results support findings of this experiment.

4. Conclusions

In semi-arid climate, water is an essential input for agriculture. But irrigation with polluted waters always has the risk of soil pollution which cause various harmful effects on plant growth and development. In this experiment irrigation with Boron-amended waters resulted B accumulation in the soil. This study showed that under semi-arid climate and experimental field conditions cotton may tolerate B-amended water ranging up to 4.0 ppm. But irrigation even with 4.0 ppm B-amended water resulted 2.36 ppm and 1.90 ppm B accumulation in the 0-90 cm Menemen and Soke plain soil profiles respectively at the end of five years. Higher B concentrations of irrigation waters may result more hazardous effects on soils and will cause yield reduction on cotton growing areas. These results agree with previous reports of Sener and Ozkara (1988) in Turkey.

Nable et al.,1997 reported that, irrigation water containing 5 mg B per liter, may not be immediately toxic to plants, but after prolonged period of irrigation with such a water, soluble soil B levels will equal or exceed those of the irrigation water, especially in regions of low rainfall or where water used for leaching is unavailable. When such accumulation has occured, plants sensitive to B will perish or plants more tolerant to B will have to be grown, or soil must be reclaimed.



Irrigation waters with high B concentration should not be encouraged for permenant use in agricultural lands for crop production. If it is necessary, the use of B polluted water for irrigation requires that consideration must be given suitable soil and water management and selection of B-tolerant crop. As fresh water supplies become less available for leaching purposes more research must focus on introducing plant specials that are tolerant to poor soil and water conditions.

REFERENCES

Akbas, F., 1999. Değişik Bor Konsantrasyonlu Sulama Sularının Pamuk verimi ve Bor Birikimine etkileri. Toprak ve Su Kaynakları Araştırma Yıllığı, 1998 Yayın No: 108, Ankara. pp. 178-189.

Anonymous, 1999. Drainage Reuse Final Report. The San Joaquin Valley drainage implementation program, Dept. of Water Resources, Sacramento, California.

- Anonymous, 2002. Re-analysis and integration of long term yields from agricultural experiments and five districts of the Aegean Region of Turkey. Agrohydrology Research and Training Center, Turkish-Israel Joint Research Project Final Report, Menemen, Izmir, Turkey. pp. 69.
- Banuelos, G.S., Mackey, B., Cook, C., Akohoue, S., Zambrzuski, S. and Sambra, P., 1996. Response of cotton and kenaf to Boron-amended water and soil, Crop Science Vol. 36, no: 1 Published by CSSA, Madison, Wl. 158-164.
- Bergman, W., 1988. Ernahrungsströrungen Bei Kulturpflanzen. Gustav Fischer Verlag Stuttgart, 1988. B, 339-476, 762 pp.
- Goldberg, S., Shouse, P.J., Lesch, S.M., Grieve, C.M., Poss, J.A., Forster, P.S. and Suarez, D.L., 2003. Effect of high Boron application on content and growth of melons. Plant and Soil 256 (2): 403-411 Oct.
- Kacar, B., 1972. Bitki ve toprağın kimyasal analizleri, bitki analizleri, Ankara Universitesi, Ziraat Fakultesi yayın No: 453, Uygulama Klavuzu. Ankara. 705 pp.
- Kacar, B. and Katkat, A.V., 1998. Bitki besleme. Uludağ Universitesi Güçlendirme Vakfi Yayın No: 127 Özsan Matbaası, Bursa. 595 pp.



Konuk, F. and Colakoglu, H., 1995. Bor etkisi altindaki baglarda uygulanan kalsiyum cozeltilerinin asma beslenmesi ve cekirdeksiz uzum kalite ozelliklerine etkisi, I.Akalan Toprak ve Cevre Sempozyumu cilt II Ankara.

Nable, R.O., Banuelos, G.S. and Paull, J.G. 1997. Boron toxicity, Plant and Soil 193: 181-198,1997. Kluwer Academic Publishers, Nedherlands.

- Ozkara, M.M. and Sener, S., 1986. Jeotermal atıkların Büyük Menderes Nehrine karışmasının Aşağı Büyük Menderes Havzasının tarımsal yapısına etkileri. In: Uslu, O.(ed.), Cevre '86 Sempozyumu, Izmir, Turkiye. pp. 444-455
- Rhoades, J.D. and Loveday, J., 1990. Salinity in irrigated agriculture, irrigation of agricultural crops. In : B.A. Stewart and D.R. Nielsen (Eds), American Soc. Of Agronomy, Madison, Wisconsin USA. pp. 1091-1136.
- Richards, L., A., 1954. Diagnosis and improvement of saline and alkali soils, Agriculture Handbook no: 60 United States Dept. of Agriculture Washington D.C. 160 pp.
- Sener, S. and Ozkara, M.M., 1988. The Boron pollution of Simav Creek waters and its effects on the soils and agricultural crops of Balıkesir region. Proceedings of an international symposium on plant and pollutants in developed and developing countries. (Ed: Ozturk, M.A), Izmir, Turkey. pp. 411-420
- Sener, S., Kayam, Y. and Kodal, S., 1992. Consumptive use and irrigation water requirements of principal crops in Turkey. Publication number:180/31, Soil and Water Research Institute of Ministry of Agriculture and Rural Affairs, Menemen, Izmir, Turkey
- Sener, S., Akbas, F. and Kose, C., 1995. Değişik Bor konsantrasyonlu sulama sularının pamuk Bitkisinin gelişimine, verimine ve toprakta oluşabilecek Bor birikimine etkileri. Munsuz, N., Unver, I., Caycı, G., (Editors). İlhan Akalan Toprak ve Cevre Sempozyumu, 9-12 September 1995, Ankara, Turkey. Cilt 1. A 334-A-345
- Simard, R.R., Charron, G. and Pageau, D., 1996. Field calibration of Boron soil tests for barley. Communications in Soil Science and Plant Analysis 27(5-8): 1631-1646
- Smith, C.W.,1995. Crop production, evolution, history and technology. John Wiley &Sons inc.New york,USA.
- Sonmez, B., 2003. Turkiye coraklik kontrol rehberi, Tarim ve Koy Isleri Bakanligi, Toprak ve Gubre Arastirma Enstitusu, Teknik yayin no. 33,Ankara
- Tuzuner, A., 1990. Toprak ve su analizleri laboratuvarları el kitabı, Köy Hizmetleri Genel Müdürlüğü, Ankara. 267 pp.



- UNEP, ILO,WHO,1998., Environmental health criteria, 204, Boron mining and production./ Full text via cross Ref./cited by in Inchem.
- Vengosh.,A., E Weinthal,W.Kloppmann and Boramed Team, 2004., National boron contamination in Mediterrenean ground water. /full text via cross Ref./cited by in Geotimes,May 2004.




AN APPROACH FOR ENABLING SUSTAINABLE ACCESS TO URBAN LAND AND LAND TENURE IN THE SOUTHERN AFRICAN COUNTRY OF NAMIBIA.

Jane GOLD

Polytechnic of Namibia, NAMIBIA jgold@polytechnic.edu.na

The country of Namibia has a relatively small population of just over 2 million inhabitants. Namibia, situated just north west of South Africa, has long existed in the shadow of the latter country. Now with 15 years of democratic independence, a new government and a Vision for 2030, the country is poised at realistically achieving sustainable economic development for the poorest and most needy sector of the urban population in the country. The draft Flexible Land Tenure Bill sets out the parameters for options that the most marginalized urban poor can afford and upgrade, as and when circumstance allows, as well as having security of tenure ensured.

The Shack Dwellers Federation of Namibia, in partnership with the City of Windhoek, and some smaller local authorities, such as Gobabis, have already started implementing this concept with a fair level of success, despite limited support. The key to the national success of the concept lies in broader acceptance of the challenges and roles through:

- support from Government, via approved legislation,
- recognition, and active support by local authorities of what is sustainable by the urban poor as well as acceptance of the need for a series of upgradeable options, and
- empowerment of the poor through organizations such as the Namibia Housing Action Group, Better Life and the member driven Shack Dwellers Federation of Namibia, themselves.

INTRODUCTION:

Namibia, situated to the north west of South Africa gained independence from the latter country in 1990. It is a moderately sized country, covering about 824, 269 km2. This is roughly 3% of Africa's total land area. But due to the harsh arid Namib Desert the country has a relatively low population of only 2 030 692 in 2004, which translates to about 0.3% of the continent's population. (Standard Bank, Namibia in Figures, 2005/2006 edition. Information Brochure)





Figure 1: showing locality of Namibia on the continent of Africa.

It is this fact of a small population that possibly makes Namibia somewhat unique in dealing with critical issues such as the environment and sustainability because there is the potential to realistically manage and resolve the issue of making urban land accessible, affordable and sustainable within the country.

After 105 years of various colonial rule, the country gained freedom and attained democracy. Along with this, was a dramatic change in the new constitution that allowed for freedom of movement and the right to live where one so chooses. So for the first time in over a century, people were free to choose where they wanted to live. The urban areas throughout the country exploded with people. Not one local authority was prepared for this unprecedented growth and it called for rapid responses.

A survey undertaken by the Ministry of Regional Local Government, Housing and Rural Development (MRLGHRD), in conjunction with the Namibia Housing Action Group (NHAG) and the Shack Dwellers Federation of Namibia (SDFN), indicated that over 70 000 households through out the country were living in informal shelters in urban areas. (Republic of Namibia, National Plan of Action, 2002, p 10). The current national urbanization rate stands at 3.75% per annum. The capital city of Windhoek has taken the brunt of the immigration and the figure stands at 3.93% per annum. This is approximately 11 079 persons and 2 400 households each year, most of whom are representative of the marginalized sector of the population. (City of Windhoek, 2004, p4).

The living conditions in areas of informal housing are typically precarious, especially with regard to uplifting standards of services and environmental health. A major institutional effort nationwide that focused on the demands of rapid urbanization, as well as the vast potential of human resources, was required to deal with this challenge.



Closely linked to the urbanization, is that the majority of the new residents in urban areas are very poor, often unemployed or informally employed. The unemployment rate is high, estimated at 34,5% in 2005. (Namibian: newspaper article, July 2006). The gap between rich and poor are believed to be amongst the highest in the world. (Republic of Namibia, op. cit, p 9).

Affordability on the part of the homeless is one of the main constraints when it comes to housing delivery in Namibia. Due to poverty, the majority of the population has no access to adequate income and thus cannot afford decent shelter, or payment for land.

At the same time, local authorities in Namibia are unable to keep pace with the rapid urbanization. They sit with the problem of having to ensure that land and services are provided. Due to the formal land delivery process in place, and exacting high standards for town planning, land survey and registration as well as the comprehensive level of services provided the costs of land delivery are exorbitant. In addition, the cumbersome procedure for approval to freehold title is extremely slow. It takes between 18 and 24 months from initial planning to have the land available for occupation. The current legislation furthermore, does not cover the regularization or formalization of existing settlements and there is currently no legally acknowledged status of this concept as a national priority.

THE GOVERNMENT RESPONSE.

At Independence the Government gave attention to the issue of land distribution and ownership. Starting with the Constitution that gives rights to all Namibians to acquire, own and dispose of property. To speed up the access of land, three main aspects were addressed:

- 1. adjust planning procedures to deal with the rapid urbanization,
- 2. make the level of infrastructure appropriate to the people's needs and affordability, and
- 3. establish a procedure for a faster, more affordable provision of secure land tenure.

Informal settlements that have developed since Independence should also be included in this process of security of tenure. Where residents are affected by the upgrading of the settlement, alternative land should be made available, with the opportunity for obtaining secure tenure through upgrading the tenure system from the right to occupy a site within a block, to a more defined site in the block to eventual freehold title.

The current use of a freehold title is the only means for economic development needs to be changed. The poor families with freehold title in reality will seldom qualify for a bank loan due to their lack of creditworthiness from not having formal employment, and no record of repayments. The freehold title should not be necessary, but rather the security of the tenure as such should be adequate for the needs of the poor. It means that they will not be evicted, and the security of this knowledge alone should enable confidence enough to invest their savings in improvements to their houses.



The National Land Policy states that the majority of Namibians cannot afford freehold title upon occupation of the land. Rather, that a range of options of secure land tenure should be made available. The options should include security of title to be held by a group, as well as individuals. The titles that are offered to the lower income groups should be upgradeable, as and when the individual circumstances allow. The upgradeable options should be allowed to occur incrementally to the eventual stage of freehold title. (Republic of Namibia, 1998, p 7 and 8).

To accommodate the needs of the poorest, a system of land tenure that is flexible and interchangeable was proposed. "The land tenure system must offer different levels of tenure (*parallel*) at different costs with the ability to move from one level to the other (*interchangeable*)." (Christensen, 1997, p2).

The aim of this flexible land tenure system is to enable access to affordable land for the most marginalized sectors of the population. It is a system of upgradeable options that the poor may follow to gain security of tenure. The first level, called "starter title" and comprises of a block of land that may have up to 100 families resident thereon. Ownership of the land may be held by a variety of organizations, such as the local authority, the private sector developer, the NGO or CBO. The perimeter of the block is surveyed according to the existing survey regulations and has therefore a high level of accuracy. The boundary is registered at the Deeds Office in Windhoek as a plot. This starter title supplies the following rights to the holder:

- The right to perpetual occupation of a site within the block, or in a similar block; and
- The right to transfer, or otherwise dispose of the right subject to custom, or a constitution, of the group occupying the site.

This title will enable the holder of the right to build a permanent structure, without fear of forced removal. The holders of these titles will have a "holder's copy" starter title certificate. This may be issued by the local property office staff and registry records. A conveyancer or legal practitioner is not required to prepare the documents.

The landhold title is a statutory form of tenure containing the most important aspects of land ownership but does not have the full complications of freehold ownership. This title supplies the owner with the right to occupy a defined site. The land can be sold, transferred, mortgaged and otherwise disposed of. The title for landhold will be held at the local property office on a computer based registration system. Similarly to the starter title, the local property staff will be sufficiently equipped to deal with the registration of the title. The internal demarcation of the plots is done by a land measurer, in close collaboration with the residents of the block. The landhold title site will also be indicated on a cadastral map, prepared by the land measurer.



The final title is that of freehold title. Perhaps a few modifications might be required statutorily, otherwise the title remains the same as currently applicable in Namibia.

Upgrading of tenure types will be dependent upon the whole group making this commitment together. The formal layout will have to be approved in accordance with the normal legislation.



Figure 2: Schematic diagram showing the possible options to follow where upgrading an informal settlement or when planning a new development. (Christensen, 1997, p74)

This concept has evolved into a Bill on Flexible Land Tenure and is also applied through a policy. The delay in enacting this proposed legislation has resulted in the process not being as rapid as it could be throughout the country. By progressing slowly there might have caused some unintended benefits, such as for the Polytechnic of Namibia, which is a practically orientated tertiary institution where the Department of Land Management is busy training technicians who will be able to assist in the process of securing land through their fields of land surveying, land use planning, valuation and land registration.

The biggest hindrance to the system is that the bureaucratic system for dealing with land developments in urban areas, inherited from the pre-independence era remains in place.



THE PEOPLE'S ECONOMIC RESPONSE:

Individuals have realized that when working as a group, they can achieve far greater economies of scale than if they were battling alone. Many individuals have subscribed to the approach of the Shack Dwellers Federation of Namibia (SDFN). They form groups that save together, often on a daily basis, to raise sufficient funds to pay a deposit for a block of land. Then they work together to obtain their land tenure occupation, as well as serviced land and formal housing. There are currently over 300 savings groups registered in Namibia, with a membership of over 13,250 individuals: of which 8,345 of the members are women and 4,912 men. (NHAG: pers. com.) The Namibia Housing Action Group is a non-government organization that gives technical support to SDFN.

The savings groups have made great in-roads towards improving the quality of lives, instilling ownership and realization amongst the urban poor in Namibia. Other ancillary goals are also realized in the process. These include income generation, health care and environmental enhancement and protection. Most of these activities have started generating specific projects within the savings scheme groups.

There are two ways that savings groups can upgrade their standard of living and obtain secure tenure, as indicated in figure two above. Firstly, they may re-settle to a clean block of land, or they may upgrade while remaining on the block of land.

There is a clearly defined process through which the savings groups must go, to reach tenure security, service development and formal construction of housing. The process is identical for both options of upgrading. This is set out as follows:

- Registration of members of the savings group with the SDFN (each complete a form in which they specify income levels, household size, and other socio-economic data)
- Democratic selection of leadership (committee) from within the group
- Determination of size of land needed and submission to the City of Windhoek, or relevant local authority, for block of land
- Acquisition of land from the local authority
- SDFN works with the group's committee to devise a layout for the plots, sewerage and water pipelines, and roads on the land.
- The layout is submitted to the local authority for approval.
- Once approved, the people are re-settled to the new land with support from the local authority and the SDFN.
- Loans are obtained from the Build Together Scheme for funds to install basic sewerage pipelines and toilet blocks, and water pipelines.
- Members of the group apply for loans individually from the Build Together Scheme to build their formal houses.



| | | | Build | Total number |
|--------------|---------------|---------------|---------------|----------------|
| | SDFN | Social Fund | Together | of |
| REGION | Beneficiaries | Beneficiaries | Beneficiaries | Beneficiaries. |
| HARDAP | 40 | 2 | 0 | 42 |
| KARAS | 5 | 0 | 14 | 19 |
| OSHANA | 71 | 0 | 24 | 95 |
| OTJOZONDJUPA | 126 | 1 | 0 | 127 |
| ERONGO | 59 | 0 | 70 | 129 |
| OMAHEKE | 51 | 1 | 0 | 52 |
| KHOMAS | 93 | 5 | 226 | 324 |
| TOTAL | 445 | 9 | 334 | 788 |

Table 1: Total number of houses constructed between 1999 and 2006, by the poor.

(source: NHAG/SDFN working documents)

As indicated in the above table, the quantities of houses that are built on land that has been secured for the urban poor is minimal and still has potential for being made to develop at a much faster rate, if the land delivery mechanisms were not so bureaucratic and cumbersome. During this lengthy process the groups begin to identify more and more with the concept of ownership and individuals begin to deal with specific challenges that emerge on their block of land. Some of the shortcomings that have been experienced over time concerning the model are:

- There is little participation by the community, often with little or no initiative.
- Individuals do not fully understand the process and therefore do not take full ownership.
- Lack of awareness or regard for environmental issues.
- General ignorance of general town planning principles.

This process of enabling the poor to manage their own level of development has changed the concept of tenure security completely in Namibia. It is economically affordable, people are empowered and the process is virtually sustainable for local authorities. The concept of Flexible Land Tenure in Namibia has attracted the attention of the international community who often use it as an example of good land reform.

CONCLUSION:

While the concept of flexible land tenure has merits in dealing with urban land reform, especially with regard to setting up a process whereby the poorest can access land on an economic basis as well as ensuring its sustainability, the concept still has room for improvement in implementation in Namibia.

Some of the major areas of support include:

1. support from Government, via approved legislation of the Flexible Land Tenure Act, as well as an investigation into more efficient ways of dealing with applications for land delivery,



- 2. Recognition, and active support by local authorities of what is sustainable by the urban poor as well as acceptance of the need for a series of upgradeable options, and
- 3. Empowerment of the poor through organizations such as the Namibia Housing Action Group, Better Life and the member driven Shack Dwellers Federation of Namibia, themselves.

Annexure 1: List of Abbreviations

MRLGHRD: Ministry of Regional Local Government, Housing and Rural Development NHAG: Namibia Housing Action Group SDFN: Shack Dwellers Federation of Namibia

Works Consulted:

Christensen, S. and Hojgaard, P.D.; Report on a Flexible Land Tenure System for Namibia; Ministry of Lands, Resettlement and Rehabilitation, Namibia, February 1997.

City of Windhoek, Brochure on Urban Demographics, January 2004.

Fuller, B.; Upgrading of Shanty Areas in Oshakati; Ministry of Regional, Local Government and Housing, Namibia, May 1996

Gold, J.; The Historical Development of Namibian Societies and the Status Quo of Urban Segregation in Namibian Cities, in Gonzalez, S-A. (ed) Cities Divided: Spatial Segregation in Urban Africa; Acophe, Barcelona. 2005.

Gold, J.; Muller, A.; Mitlin, D.; The Principles of Local Agenda 21 in Windhoek: Collective Action and the Urban Poor, International Institute for Environment and Development, London, December 2001.

Harring, S.L. and Odendaal, W.; "One day we'll all be equal"... A Socio-Legal Perspective on the Namibian Land Reform and Resettlement Process; Legal Assistance Centre, Namibia, January 2002

N'Dow, W. (n.d). http://www.iisd.ca/volll/1104oo2e.html. 10 October 2006.

Republic of Namibia. The Constitution of the Republic of Namibia of 1990. Ministry of Regional, Local Government and Rural Development and the Namibia Institute for Democracy. 2002

Republic of Namibia: National Plan of Action; Ministry of Regional, Local Government, Housing and Rural Development, Namibia, March 1996.

Republic of Namibia; National Land Policy; Ministry of Lands, Resettlement and Rehabilitation, Namibia, April 1998



South Africa. The Department of Constitutional Development. Local Economic Development. South Africa: Isandla Institute. (No date).

Stals, E.L.P. Urbanisation in South West Africa/Namibia. An Exploratory Study. Windhoek: Bureau for Research, Academy. 1987

Standard Bank, Namibia in Figures, 2005/2006 edition. Information Brochure

SWAPO Party. Election Manifesto 2004. SWAPO's Plan of Action for Peace

The World Bank. Country Assessments: Namibia 2002. http://web.mit.edu/urbanupgrading/upgrading/case-examples/overview-africa/country ass... 10 November 2006.

Woods, C. (2003). Taking note: A range of perspectives on the issue. http://www.creativeresistance.ca/awareness01/2003-aug17-taking-note-arange-ofperspe... 11 November 2006.





A QUALITATIVE APPROACH IN ENVIRONMENTAL VALUATION METHOD

Kamran ZENDEHDEL, Wim DE KEYSER², Guido VAN HUYLENBROECK

¹Department of Agricultural Economics, University of Ghent, Coupure Links 653, 9000 Ghent, Belgium ²SIA, Hemelstraat 90, 9200 Dendermonde, Belgium Kamran.zendehdel@ugent.be Guido.VanHuylenbroeck@UGent.be

Different authors have advanced various proposals for finding and estimating values for environmental goods and services. In this field, Contingent Valuation Method (CVM) has been used as a most conventional methodology around the glob. The CVM considerable shortcomings, and the difficulty of reconciling conflicting monetary estimates, are also discussed in a growing literature. Critics have questioned the appropriateness of both the method and the technique. For most critics, the neo-classical economic value theory underlying CBA and CVM is overly restrictive and the methodology is more unrealistic. To remove the restriction, practitioners have tried to increase reliability and legitimacy of CVM by using some new methodologies namely Choice Modelling (CM) and Group Based Valuation (GBV) methods. Although CM and GBV try to simplify environmental complexity and provide a forum of manifestation of equality among a small group of citizen-stakeholders but, these methods still have some difficulties in practice. People are not an instrumental measurement and they have no numeric unit for measuring environmental goods and services. They are ordinal and their answer to an appreciation is always ordinal. It raises a question that why we need to follow a monetary approach to find out people values. In this paper we try to introduce a qualitative and deliberative structure to elicit respondents' preferences by using an ordinal scale.

Keywords: Environmental valuation methods, plurality of environmental values, qualitative multi-criteria decision method, ordinal scale, ARGUS method.

1) Introduction:

Proponents of neo-classical economic value theory believe that people preferences toward nature have three properties. They are complete, continues, and transitive (Geregory, 2001; Vatn, 2004). However, the case can be found when every body has enough knowledge to catch the environmental aspects and a complete set of experiences to trade them offs against each other. Monetary valuation 'such as Contingent Valuation Method (CVM)' requires the definition of commodities in a way fundamentally identical to marketed goods and services. The essential message of this theory is that individuals are able and willing to exchange one bundle or combination of goods for another and can do so without affecting their welfare level. But in the real worlds a lot of studies have showed that people do not agree to trade-offs environmental service with their income(O'Neill, 1993; Kahneman et al., 1993; Sen, 1995; O'Hara, 1996; Jacobs, 1997; Sagoff, 1998; O'Connor, 2000; Brouwer, 1999; Spash 2000b; Perkins 2001; Spash, 2002; Wilson and Howarth, 2002; Smith, 2003; Vatn, 2004; Zhang and



Li, 2005; Meyerhoff and Liebe, 2006; Howarth and Wilson, 2006). Inconsistency between environmental valuation methodologies and nature of information that people hold produces different kind of disturbances between the amount that people are willing to pay and the level of environmental goods and services (embedding effect). To find a remedy to eliminate these difficulties and biases, researchers have tried to use some alternative methodologies namely Deliberative Valuation Approach (DVA) and Choice Modelling (CM). Although DVA helps respondents to construct their preferences during the deliberation procedures (Jacobs, 1997; Sagoff, 1998; Wilson and Howarth, 2002), but it still follows a monetary format to elicit respondents' values (Sagoff, 1998; Howarth and Wilson, 2006).

Choice Modelling is another family of survey-based methodologies used for modelling preferences for goods, where such goods are described in terms of their attributes and of the levels of these attributes (Garrod and Kenneth 1999; Garrod G, 2004; Mogas, et al., 2006). Thus, respondents may be asked to rank alternatives, to rate them individually using a semantic or numeric scale or, most commonly, to choose their most preferred (Garrod G, 2004; Cooper et al, 2006). The methodology can successfully be applied in some cases with limited number of attributes, but when the number of attributes increases, it is hard for respondents to make a right choice. In environmental cases if one wants to take into account different environmental criteria to cover plurality of environmental values, the number of attributes and level of them might be simply raised to 40-50 parameters that it would be difficult for respondents to keep those attributes in mind when they are going to make a choice among bundle of choices (Miller, 1954; Satty and Ozdemir, 2003; Jarrold and Towse, 2006).

To elicit respondents' preferences consistently, we try to adopt a qualitative and deliberative approach. It uses a Multi Criteria Decision Aid (MCDA) format to provide the opportunity to respondents to show their preferences through a preference matrix. Before elicitation process, a deliberative structure motivates different stakeholders to be involved in discussion and helps them to understand the importance of different environmental criteria (Sagoff, 1998; Munda, 2004). By having a set of environmental criteria and plausible alternative plans, we use an outranking approach to come up with people preferences through an important table and preference matrix. A qualitative and verbal value elicitation procedure helps people to use their experiences and knowledge more efficiently to come up with their preference toward environmental criteria. In this methodology respondents are asked to use a 5-point qualitative scale to attach the importance to different criteria and give their preferences in a pairwise comparison between two alternatives on a single criterion by using a qualitative scale that will be discussed.

The paper itself comprises five main parts. Then section 2 goes around environmental complexity. Section 3 discusses valuation approaches and plurality of environmental values. Section 4 gives an introduction to qualitative environmental valuation methodology with following example. At the end conclusion gives an overview and some recommendations over the subject.



2. Environmental complexity and valuation methodologies:

Complexity is one of important characteristics of environment. This obvious observation has important implications on the manner in which valuation approach and decision-making is framed (Munda, 2004). In this way first step towards a comprehensive assessment of ecosystem goods and services involves the translation of ecological (structures and processes) economic and social complexity into a more limited number of functions and attributes (Keeney et al., 1990; De Groot, 2002; Limburg et al., 2002). So any kinds of value articulation institutions have to deal with the complexity in such a way to be sure that respondents could make an appropriate communication with the chosen procedure (Hill and zammit, 2000). A system is complex, if the relevant aspects of a particular problem cannot be captured by using a single perspective (Limburg, et al., 2002; Munda, 2004). A valuation framework must not only be able to capture the range of environmental values and engender greater participation in planning and management it must also be able to cope with issues of complexity, uncertainty, distribution and multiple objectives (Hill and zammit, 2000). CVM has little to do with complexity (O,Connor, 1999). As CVM is dealing with one criterion (economic) it simply neglects the other environmental criteria (social and ecological) (Diamond and Hausman, 1994).

As economic processes become more complex and trade makes them less understandable and controllable at the local level, the need for alternative valuation methods becomes more pressing, since the value of unmarketed goods and services is contextual and socially or communally mediated. Discourse-based valuation fits into this trend by legitimating social and deliberative valuation processes (Jocobs, 1997; Perkins, 2001; Howarth and Wilson, 2006). In this sense, discursive techniques can be considered as providing a forum for discussing social value; one that serves as a constructive approach for eliciting economic value judgments for complex environmental issues.

Choice modelling (CM), is also a new methodology to reduce the magnitude of the task facing respondents and to reduce the computational complexity of estimation, the desired set of attributes and attributes levels can be used to define the profiles through the specification of a factorial or fractional factorial experimental design to estimate the utility function for the good in question. Complete factorial designs typically offer a huge number of combinations of profiles and the design problem condenses down into the question of how to sample from the complete factorial design in such a way that all parameters of interest can be estimated with reasonable statistical efficiency (Garrod, 1999). On the other hand Multi-Criteria Method (MCA) has been suggested as a better technique especially in regards to problems where complexity, uncertainty, distribution and multiple objectives are inherent. MCA is explicitly capable of articulating across economic, ecological and social criteria and objectives as well as across economic, ethical and moral values and a variety of motivations and beliefs. Thus it does not attempt to make all values commensurable and assumes weak comparability (Costanza and Folke, 1997; Springael and De keseer, 2004; Munda, 2004).



3. Valuation approaches and plurality of environmental values:

A recent trend in the environmental valuation literature is toward a pluralistic conception of value. Just as we are beginning to acknowledge and accept the diversity and complexity of natural systems and processes, it may be time that we begin to accept and embrace the diversity and complexity of the human situation and our interdependencies with the natural world (Smith, 2003; Munda, 2004). By accepting a philosophy of value pluralism, we accept the irreducibility of values to a single super-value (happiness, pleasure, utility). By accepting a conception of value pluralism, we can become more tolerant of the methodological comprehensiveness necessary for valuation, including multiple motivations of values and multidisciplinary approaches to valuation (Munda, 2004). As we know different group of society hold different kind of values about environment and different environmental criteria have different meaning for different social groups. In this situation how do liberal democratic institutions respond to the plurality of environmental values? How do they ensure that policy decisions effectively reflect the array of values held by citizens?

During the last decades, opponent of Cost-Benefit Analysis (CBA) have argued that those economic valuation methodologies that is based on a economic criterion have made a misunderstanding of the nature of human preferences and privileges allocational or economic efficiency over the principles. The theoretical and pragmatic defence of values that of the environment is insensitive to the plurality of values that we associate with the non-human world. Decisions that draw heavily on the use of extended CBA will misrepresent our environmental values and commitments (Jacobs, 1997; Sagoff, 1998; Spash, 2000b; Smith, 2003). Typically, environmental economists believe that biases within CV can be eliminated, given more research and greater sensitivity in surveying. However, these biases may in fact be a misunderstanding of the nature and diversity of values that we associated with the nonhuman world (Smith 2003). People may have a wide range of wants and preferences which will be influenced by their particular moral outlook. Utilitarian resolves these conflicts by the neutral and impersonal rule that of all the policies available to government, the one which is likely in its consequences to procure the greatest amount of want satisfaction is the course which should be chosen. Individual preferences are shaped by a number of factors that will affect either behaviour in existing markets or responses in valuation approaches. They include availability of information and, social and economic constraints. An individual may not be in an economic or social position to act on information (this is one of the limitations of hedonic pricing method) or their sense of how it is possible to make trade-offs between different environmental criteria (it is one of limitation of state preference methods). Aesthetic and ethical considerations are qualitatively different from economic valuation. What, after all, does the economic value of an obligation to future generation, or of the commitment to the preservation of aspects of the non-human world, actually mean? That economists generate a monetary value is unquestionable; what precisely that value represents is another matter. Obligations, duties and commitments to environment are judged by other criteria than utility. CBA is an excellent example of an aggregation technique that priorities allocational efficiency. But, according to value pluralism, efficiency is just one of a diversity of values that might guide policy decision. Conditions need to be created in political institutions in which a diversity of what may be incommensurable and incompatible values, goods or decision rules in judgments can be appealed to, and the alternative policy options that emerge assessed.



Deliberative valuation approaches is a new methodolgy that wants to add social equity to economic efficiency criterion (Jocobs, 1997, Sagoff, 1998; Wilson and Howarth, 2002; Howarth and Wilson, 2006). The reasoning behind the deliberative approach is a relatively straightforward extension of social equity as procedural fairness (Wilson and Howarth, 2002). Although deliberative valuation approach provides a forum of manifestation of equality among a small group of citizen-stakeholders and involves open deliberation focused on the task of consensus reaching about the social value of an ecosystem good or service, but it did not explain how different social group of society might be satisfied from out put of deliberative approach (Smith, 2003; Tompkins, 2003). Consensus is an important aim for deliberative methods and it supposes individual can reach a consensus after a short or long deliberation and reasoning. Consensus could be captured if all the information about problem on hand was available and understandable and all different parties have the same benefit through those environmental services. In reality, different groups of society have different aspects about environment. In this situation, making a consensus is possible but, it is extremely cumbersome. On the other hand we can not be sure that a consensus is always the best option among different alternatives. Some times a consensus reaching process can make some difficulties for an open dialogue (Smith, 2003; Springael and De Keyser, 2004). It is because an expectation of consensus can create a barrier to critical dialogue and lead to further marginalization of perspectives (Smith, 2003).

As we explained choice modelling is one of those methods that try to capture different environmental values by taking into account different environmental attributes (Garrod, 2004; Cooper et al., 2006). In CM respondents are presented with various alternative descriptions of a good, characterised by a set of independent attributes and differentiated by variations in the levels of these attribute, and asked to provide information on their preference for the various alternatives. Proponents of CM approach believe that CM mimics real choice environments; they more accurately predict actual choice. Here a question rises that how much we can be sure that participants can make a right choice between different alternative choices. As we know the human mind can not handle more than 7 ± 2 attribute at the same time (Miller, 1954; Satty and ozdemer, 2003; Jarrold and Towse, 2006). So it is obviously clear that adding more attributes to cover plurality of environmental values makes it hard to compare different options with some attributes. An outcome of these discussions might be that the political and social framework must find a place in some multi-attribute methodologies that can handle different kind of information in a same way and with the easiest procedure to be sure that people may not mixed up different environmental attributes (Munda, 2004; Costanza and Folke, 1997.



4. A deliberative multi-criteria approach in environmental valuation:

An important difficulty face to environmental valuation methods is how a researcher can add more criteria without confusing respondents with extra information. How valuation methodologies can satisfy three properties of plurality of environmental values, environmental complexity and social equity to be sure that those elicited values can be considered as a true individual preference. We know that in some way plurality of environmental values and social equity would be captured through the group deliberation (Jocobs, 1997; Sagoff, 1998; Howarth and Wilson, 2006). On the other hand it seems that CM can consider different environmental criteria (ecological, social, and economic) in a same way without using commensurability. By taking into account the advantage of these two methodologies, we tried to establish a new framework for environmental valuation. The new methodology is a deliberative multi-criteria valuation method that can elicit respondents' preference more consistent with respondents' information. Figure 1 shows a simple pattern about a Multi-Criteria Decision Aid (MCDA). As we can see in the first part (construction) we can construct preferences and in the second part (exploitation) social values would be exploited (Guitouni and martel, 1998).



Figure 1. Schematization of a MCDA method, (Guitouni and Martel, 1998)

In general, MCDA methods have not been considered very relevant by researchers to elicit environmental value in the past (Munda, 2006). Even when researchers used them, they transform the qualitative values to quantitative form (cardinalisation of criterion weights through using cardinal or ratio scales) to achieve statistical properties to analysis the results that it can change the quality of information (Tompkins, 2003; Proctor and Drechsler, 2003, Springael and De Keyser, 2004). If we refuse any kinds of trade-offs between environmental goods and market products, consideration of a method with assumption of weak commensurability between different dimension would be appropriate.

To move in a right direction and to avoid applying cardinalisation, we established following stages (figure 2). Figure 2 schematises the different steps of the methodology to find out respondents' preferences. The two first steps, problem and stakeholder identification are completely related to each other. In this way, the institution analysis involves the study of how rules shape human behaviour and how institutions can be supposed as a law or as a rules-in-use and norms.



A stakeholder analysis helps us to identify primary stakeholders (groups) (Munda, 2004). Stakeholders include all those who affect, and/or are affected by, the policies, decisions, and actions of the system. (Grimble and Wellard, 1997) define the term stakeholder as 'any group of people organised or unorganised, who share a common interest or stake in a particular issue or system'. Broader definitions include policy makers, planners and administrators in government and other organisations as stakeholders in the issue at hand. Often, it is possible to identify many groups which will have some interest in the problem.



Figure 2. Scheme of the environmental valuation processe (adapted from Munda, 2004).



Deliberation of stakeholder would be our next step. It should be clear that this step is a preference construction process for stakeholders. Preferences are social and they are result of learning both about what is attainable and what is socially reasonable or permissible. Preferences are plural. It means that they are neither complete and nor continues. They are organized in classes between which trade-offs are blocked or heavily restricted (Tompkins, 2003; Smith 2003; Vatn, 2004). For a discussion to be called deliberative it is essential that it relies on mutual exchange of arguments and reflections rather than decision making based on the status of the participants, sublime strategies of persuasion, or socio-political pressure. Deliberative processes should include a debate about the relative weight of each argument and a transparent procedure for balancing arguments (Habermas, 1984). In addition, deliberative processes should be governed by the established rules of a rational discourse. (Renn, 2006) Deliberation can produce common understanding of the issues or the problems based on the joint learning experience of the participants with respect to systematic and anecdotal knowledge. Deliberation can produce a common understanding of each party's position and reasoning and thus assist in a mental reconstruction of each actor's argumentation (Renn, 2006). As we are dealing with public good, we propose to use a deliberative structure to find out what are the most socially desirable alternative plans and important environmental criteria. This stage is very important, because we are going to elicit respondents' preferences through the criterion weight and a pairwaise comparison of alternatives on different environmental criteria. Deliberative structure by using a neutral moderator and a group of experts can guarantee the possibility of using different knowledge from different actors. It also increases validity and legitimacy of the procedure. (Jacobs, 1997; Sagoff, 1998; Wilson and Howarth, 2002; Munda, 2006). When the group wants to come up with a list of criteria, four parameters have to take into account, (Tompkins, 2003):

- 1. Completeness (all criteria are reflected)
- 2. Decomposability (the criteria cannot be refined into further sub-criteria)
- 3. Absence of duplicates
- 4. Minimum size

In general, the criteria should be complete and exhaustive in that they cover all possible aspects of the decision making problem and make the analysis complete. At the same time, the criteria should be mutually exclusive (non-redundant) so as to prevent 'double counting' (De Groot et al. 2002; Proctor and Drechsler, 2003; Hompkins, 2003). The selection of criteria should be based on what is learned through the participatory process (Jacobs, 1997; Munda, 2004; Munda, 2006; Howarth and Wilson, 2006). Of course before group deliberation the experts introduce some important and obvious criteria, that group can start developing additional criteria. This procedure is more important when the group wants to discuss about future alternatives plans. It is because the entire list of alternatives should be socially desirable and practically applicable. To find out a list of desirable alternatives a consensus reaching approach would be the best option. But if the group couldn't make any consensus around the alternatives, the expert panel can choose a package of the alternatives according to individual opinions.



After finding the alternatives and the criteria, the next step is making an impact matrix (IM). Making an IM is an important task. To make an IM we need to use knowledge of experts in different branches to find out the influence of each alternative on each single criterion. This procedure makes the IM more objective rather than subjective and increases the IM validity (De Keyser and Peeters, 1994; Proctor and Drechsler, 2003; Tompkins, 2003). After making the IM table we have to add some statistics and basic information about the criteria. This information simply gives some ideas around environmental criteria and makes it easy to judge about different alternatives. All of information should be completely neutral to avoid influencing the respondents' preferences.

We believe that the involvement of all the parties in the procedure is a necessary step but elicitation of environmental values should be through an individual process. We rather prefer this method, because a consensus through the group deliberation is not always an acceptable option (Smith, 2003; Tompkins, 2003; Howarth and wilson, 2006). Of course deliberative democracy aims to engage people into policy making processes but, it is not always by involving them in the whole parts. (Pykäläinen et al, 1999). Deliberative democracy is not necessarily contiguous with direct, face to face visions of democracy (Smith, 2003). Here the principles of democratic deliberation point to all affected interests having a voice. As Smith (2003) mentioned, group deliberation should satisfy two important characteristics: Inclusiveness" are all voices heard?" and unconstrained dialogue "is deliberation defended against strategic action on the part of powerful interests?" In our method group deliberation takes place in early stages and it simply gives the opportunity to lay people to be involved in the group discussion and they can easily express their opinions and increase their knowledge. Exploitation process would be rather individualistic; because group dynamic is a strong barrier in group deliberation and it forces people to act in some way that they don't like (De keyser and Peeters, 1994; Smith 2003).

Following stages are necessary to elicit respondents' preferences and aggregate them together.

1- The respondent's preference on each criterion is modelled by using an ordinal measurement for the importance of each criterion.

2- The intensity of preference of respondents on two alternatives x_i and x_j on a criterion k is modelled by using an ordinal measurement.

3- A multidimensional scaling method would be used to visualised respondents' preferences

4- Aggregation of respondents' preferences on one criterion will be done by using a mathematical procedure.

5- A Qualitative Multi-Criteria Decision Aid (ARGUS) can be used to find out individual alternative rank.

6- By using a Branch and Bond algorithm we can construct a group alternatives' rank (social rank) around those alternatives.



4.1. Applying a qualitative multi-criteria valuation method:

As we explained, after establishing different stakeholder groups and making an impact matrix, we have to start eliciting respondents' preferences toward those environmental criteria. To do this, we choose an outranking approach to come up with respondents values. It starts attaching importance to different criteria. Weights in the framework are clearly meaningful only as importance coefficients and not as trade-off (since different ethical positions leads to different ideas on criterion importance). This also implies that the aggregation conventions used should be non-compensatory mathematical algorithms. Non-compensability implies that minorities represented by criteria with smaller weights can still be very influent (Munda, 2004). The weight of a criterion in a multiple criteria method can indicate the importance that the participant attaches to that criterion and can be used as a scaling constant. The experiences with users have shown that using an ordinal scale is easier than expressing the weights on a ratio scale (Miller, 1955; De Keyser and Peeters, 1994; Saaty and Ozdemir, 2003; Springael and De Keyser, 2004). This is one of the reasons why we propose an ordinal scale to measure the weights. The following ordinal scales reflect the importance of a criterion: *not important - Indifference - important - very important -extremely important*.

| Criterion | Importance |
|-----------|------------|
| f_1 | |
| f_2 | |
| | |
| f_m | |

The participants must indicate for each criterion, by selecting a value from the above ordinal scale, how important that criterion is for him and fill in the table 1. In other words, the decision maker must rank and classify the criteria. The role is to find out a procedure that can tackle more efficiently with complexity and incommensurability that have been attached to the environmental goods and services. It would be possible that we add or remove the number of importance classes according to the problem at hand.

Next step is modelling of the preference structure of a respondent (decision maker). It might be done in two ways. The first way is to ask the decision maker to give the intensity of his preference between two given alternatives on a certain criterion. This intensity will basically depend on the difference between the values of the two alternatives on the criterion. (De Keyser and Peeters, 1994; Springael and De Keyser, 2004). In the PROMETHEE methods (Brans and Vincke, 1985; Pohekar and Ramachandram, 2004) the intensity of the preferences is a value between 0 and 1. The intensity of preference direction is criticized because the intensity of preference, the larger the intensity of preference (Brans and Vincke, 1985; Pohekar and Ramachandram, 2004). The second way is to use credibility. For each couple of alternatives (**a,b**) one determines on each criterion **j** the concordance index $c_j(a,b)$ (being a value between 0 and 1) which reflects in which way one can affirm that "alternative **a** is at least as good as



alternative **b**". Besides the concordance indexes, discordance indexes are determined and all are aggregated into a degree of credibility (ELECTRE III) (Roy, 1978; Munda, 2004). The intensity of preference is an interesting way of modeling the preference structure of the decision maker and shows that the intensity of preference can be modeled without the above mentioned criticism by means of an ordinal variable. Consider the following formulation of a multiple criteria problem:

Max { $f_1(x), f_2(x)..., f_k(x) | x \in A$ } (Where **A** is a finite set of possible alternatives).

Consider the evaluation of two alternatives **a** and **b** on the criterion $f_i(x)$: $f_i(a)$ and $f_i(b)$ and suppose $f_i(a) > f_i(b)$. Based on $f_i(a)$ and $f_i(b)$, the decision maker can express his intensity of preference, for alternative **a** compared to alternative **b**, by selecting one of the following qualitative values:

indifferent (= *no difference*) - *small preference* - *moderate preference* - *strong preference* - *very strong preference*.

These are values of a variable measured on an ordinal scale: ordering in magnitude is possible but there are no equal intervals (De Keyser and Peeters, 1994; Springael and De Keyser, 2004). Because the representation on the intensity of preference by numbers is not unique and does not add anything but increase possible confusion with an interval or ratio scale, we propose to use in this method the qualitative values for representing the intensity of preference on an ordinal scale. This does not change in any way the character of the scale of the variable. The modelling of the intensity of preference by means of an ordinal variable can be illustrated by figure 3 for evaluations on an ordinal scale. As we can see the intensity of preferences are not limited and respondent is able to add some extra qualitative values to the list.



Figure 3. The intensity of preference for evaluations on an ordinal data (De Keyser



For this step, a preference matrix is constructed which the columns and rows include the influence of alternative scenarios on a single criterion. In this manner, respondents can concentrate just on one criterion and do not need to think about other criteria. We can then:

| ÷ | Alternative values from worst to best (from each participant's point of view) | | | | | | | |
|-------------|--|-----------------------|-----------------------|----------|----------------|--|--|--|
| orst to bes | $ \begin{array}{c} F_k(x_j) \\ f_k(x_i) \end{array} $ | V ₁ | V ₂ | | V _m | | | |
| M NO | V ₁ | Indiffer | | | | | | |
| 'es fr | V_2 | | Indiffer | | | | | |
| nativ | | | | Indiffer | | | | |
| Alter | V _m | | | | Indiffer | | | |

Table 2. Preference matrix for a criterion k

1) Order the possible values for a criterion from worst to best (V_1 to V_m respectively) (table 2). It allows participants expressing their opinion about different alternative values according to their views and it gives the opportunity to researcher to see respondent's rank about those alternatives. So the preference structure matrix is adjustable with respect to the participants' opinion and can show different actors attitudes on that specific criterion.

Complete the preference matrix (see table 3) by asking respondents to fill the lower triangle of the matrix by using 5-point qualitative scale. So in each cell, participants have to use one of those five values to make a pairwise comparison between two alternative values. For example, Table. 3 gives an IM table with four anonymous alternatives and eight criteria (Alternatives in the IM table are anonymous because we rather prefer to elicit real preferences than political preferences). We took the first column (Plant diversity criterion) and we will ask respondent to rank alternatives from worst to best. It would be his or her opinion how evaluates those alternatives. The values in each cell of the preference matrix must obey certain rules:

- The value of a cell will be the same or higher than the value of the cell just above it.

- The value of a cell will be the same or higher than the value of the neighbouring cell on the right.

But we treat all by using 5-point qualitative scale from indifference to very strong preference. It is the easiest way for respondents to explain their preferences by using a qualitative scale. A preference matrix can easily give the opportunity to people to make their choice between different alternatives on a single criterion.



Table 2.

| Alternatives | Plant diversity | Water supply | Wild life Diversity | Soil Conservat | Social Education (score*) | Recreation (score * | Cultural attributes | Cost of plans(million \$) |
|--------------|---------------------|-----------------|-------------------------|-----------------------|---------------------------------|--------------------------------|-------------------------|-------------------------------------|
| Α | Moderate Support | 5 % Increas | Moderate Support | 5 Ton per Hectare | 7 scores | 6 Scores | Moderate Support | 10 |
| В | Small Support | 10% Increas | Neutral | 3 T o n Per Hectai | 3 Scores | 3 Scores | S m a l l support | 25 |
| С | Neutral | 15% Increas | S m a l l Opposition | 7 Ton per Hectare | 4 Scores | 4 Scores | S m a l l Opposition | 35 |
| D | Strong support | Neutra | Strong support | 4 Ton Per Hectare | 6 Scores | 7 scores | Strong opposition | 55 |



Table 3. Eliciting respondents' preferences through a preference matrix.

Impact Matrix

Criteria









Table 4.

| | Strong support | Neutral | Small Support | Moderate Support |
|----------|-------------------|------------|------------------|---------------------|
| Strong | | | | |
| support | | | | |
| Neutral | Small | | | |
| | Preference | | | |
| Small | Strong | Moderate | | |
| Support | Preference | Preference | | |
| Moderate | Very | | | |
| Support | strong | Moderate | Moderate | |
| | preference | Preference | Preference | |

Respondents are familiar with this kind of comparison because they use it every day to show their attractiveness toward any kind of objectives. On the other hand the methodology simplifies environmental complexity by taking into account just two alternatives on a single criterion. It means respondent doesn't need to take into account so much information when he wants to construct his preference among two alternatives. The methodology helps respondents to focus on one aspect of the environmental problem and it eliminates influence of other criteria on that specific criterion. Having enough knowledge (through the group deliberation) and eliminating the influence of other criterion (by focusing just on one criterion), we can be rather sure that respondents can construct a pure preference toward those environmental criteria (Diamond and Hausman, 1994). The process will be done through a face to face process and respondents receive enough time to fill in the preference matrix and making a pairwise comparison.

The preference matrix shows us respondent's attitudes and how they react according to the different alternatives. To visualised respondents' preferences and giving a map of their directions, we use a multidimensional scaling approach to make a map from respondents' answer. It uses the ordinal information to build a two or three dimensional image to explain respondents' preferences and tries to make some clusters among different respondents and to find out different group of people that have similar preferences. Through the elicited information we can make different groups and sub groups to recognise different preferences and draw a distribution graph around our participants' preferences.

To find out individual ranks around those alternatives and criteria we need to aggregate the qualitative information in the preference matrix. One of the difficulties in Multi-Criteria Decision Making (MCDM) is how to aggregate the participants' specific information.



MCDM methods differ according to how the weight and preferences are combined (Tompkins, 2003; Proctor and Drechsler, 2003; Springael and De Keyser, 2004). To help policy maker to find out more easily individual ranks we propose to use a Qualitative Multi-Criteria Decision Aid (QMCDA) namely ARGUS method. ARGUS is an outranking method and stands for Achieving Respect for Grades by using ordinal Scales.

The method helps us to handle quantitative and qualitative value as well. We believe that this procedure can make a contribution to complex decision making by using the group input in policy making processes to increase validity and legitimacy of final decision and on the other hand giving the same opportunity to policy makers to make a socially desirable plan.

The best social alternative rank obviously is a consensus rank among all the individual ranks. We propose to use a mathematical procedure to come up with the final rank. We chose Branch and Bound Algorithm to make a social rank. It uses Kendall's rank correlation coefficient to find out the best rank that is the closest one to all individual rank (Springael and De Keyser, 2004). With this procedure we cab be sure that the group rank is the closest option to all individual ranks.

5. Conclusion:

As Blamey says "Ecological economics needs to be more psychologically realistic than environmental economics, as well as more ecologically realistic" (Balmey 1998). If we want to use environmental valuation techniques to estimate social value of public goods in order to inform policy makers, why we can not use a qualitative procedure to come up with people preferences? Stakeholders' preferences can be incorporated into MADM models through a weight elicitation process, and different management impacts to reflect their preferences. This appears to be a useful approach, by taking into account incommensurability of different evaluation criteria and stakeholder preference weights (Tompkins, 2003).

We believe that the absence of direct market parallels, the complexity of environmental aspect both affect the ability to judge and the possibility to calibrate a true and valid preference toward the environmental goods and services. People can not make a right estimate about the amount that they are willing to pay because; it is rather too far from their imagination. It is precisely the lack of experience both in markets for environmental commodities and in the consequences of such decision that makes contingent valuation questions so hard to answer and the responses so suspect (Diamond and Hausman, 1994). Different kinds of drawbacks that have been attached to the monetary approaches show that people are not consistent with the amount that they express (Kahneman and Knestch, 1992; Dimaond and Hausman, 1994; Grant, 1998; Spash, 2000b). Although these problems have been recognized in the literature for over a decade, they have not been solved. Thus, we conclude that the tripartite valuation of efficiency, sustainability, and equity implications of natural capital, for which there may or may not be substitutes, suggests at best a deliberative multi-criteria valuation framework (Costanza nad folke, 1997).



To improve the drawbacks of existing methodologies about environmental valuation, we propose an approach that relies on ordinal values and verbal procedures. This is based on the belief that stakeholders are more satisfied to use a qualitative scale to explain their preferences rather than expressing a monetary value to express their willingness to pay. Using a qualitative method would stimulate stakeholders to express their attitudes and believes around alternative scenarios more easily (Miller, 1955; De Keyser and Peeters, 1994, Brouwer et al., 1999 Chilton and Hutchinson, 1999). On the other hand the increased knowledge of people about the environmental ethics has resulted in a protest behaviour about the trade-offs between non traded environmental services and market products. Spash (2000) shows that protest bids are a function of lexicographic preferences. So It is which using an advanced deliberative and a QMCDA allows us to take into account different environmental criteria and helps respondents to understand difficult part of environment aspect by decomposing the problem to simple parts.

REFERENCES:

Blamey, R., (1998). Contingent valuation and the activation of environmental norms. Ecological Economics 24, 47–72.

Brans, J.P., Vincke, Ph. (1985): "A preference ranking organization method", *Management Science*, 31/6, 647-656.

Brouwer, R., Powe, N., Turner, R. K., Bateman, I. J., Langford, H., 1999. Public attitude to contingent valuation and public consultaion. Environmental Values 8, 325 – 47.

Chilton, S.M., Hutchinson, W.G., 1999. Do focus groups contribute anything to the contingent valuation process? Journal of Economic Psychology 20, 465-83.

Cooper, B., Crase, L., Dollery, B., (2006). Using choice modelling to reveal waste water preferences in regional Victoria. Desalination, 188, 31–41.

De Groot, R., Wilson, M., Boumans, R., 2002. A typology for the description, classification and valuation of Ecosystem Functions, Goods and Services. Special issue of Ecological Economics 41 (3), 367_/567.

De Keyser W.S.M., Peeters, P.H.M., 1994. ARGUS - A new multiple criteria method based on the general idea of outranking. *Vrije Universiteit Brussel- Belgium*.

Diamond, P.A., Hausman, J.A., 1994. Contingent valuation: is some number better than no number? Journal of Economic Perspectives – Volume 8, Number 4, 45–64.

Gregory, R., Wellman, K., 2001. Bringing stakeholder values into environmental policy choices: a community-based estuary case study. Ecol. Economics 39 (1), 37–52.

Garrod, G., Kenneth, G.W., 1999. Economic valuation of the environment. Methods and case studies. Edward Elgar Publishing, Inc.

Garrod, G., Ruto, E, 2004. Using choice experiments to analyse farmers' preferences for the governance attributes of agri-environment schemes. School of agriculture food and rural development, University of Newcastle upon type.

Grimble, R., Wellard, K. (1997) Stakeholder methodologies in natural resources management: a review of principles, contexts, experiences and opportunities. Agricultural Systems, **55**, 173-193.

Guitouni, A., Martel, J. M., 1998. Tentative guidelines to help choosing an appropriate MCDA Method. European Journal of Operational Research 109, 501±521



Habermas, J. (1984). The theory of communicative action I: Reason and the rationalization of society. Boston: Beacon Press.

Hill, S., Zammit, C., 2000. The Identification of Community Values for Regional Sustainable Land Use Planning and Management. In: International Society of Ecological Economists Congress 2000. Australian National University (ANU), Canberra, Australia 5-8 July.

Howarth, R.B., Wilson, M., 2006. A theoretical approach to deliberative valuation: Aggregation by mutual consent. Land Economics, Volume 82, 1, 1-16.

Jacobs, M., 1997. Environmental valuation, deliberative democracy and public decisionmaking. In: Foster, J. (Ed.), Valuing Nature: Economics, Ethics and Environment. Rutledge London, England, pp. 211–231.

Jarrold, C., Towse, J.N., 2006. Individual differences in working memory. *Neuroscience*, 139(1):39-50.

Johnson, L.T., 2006. Distributional preferences in contingent valuation surveys. Ecological Economics, Ecological Economics 56, 475 – 87.

Kahneman, D., Knestch J.L., 1992. Valuing public goods: the purchase of moral satisfaction. Journal of Environmental Economics and Management, 22:57–70.

Kahneman, D., Ritov I., Karen, E., Grant, P., 1993. Stated willingness to pay for public goods: A Psychological Perspective. Psycological science, VOL. 4, NO. 5.

Keeney, R., Von Winterfeldt, D., Eppel, T., 1990. Eliciting public values for complex policy decisions. Managment science, 36, 9.

Kenyon, W., Ceara N., 2001. The use of economic and participatory approaches to assess forest development: a case study in the Ettrick Valley. Forest Policy and Economics, 3, 69_80.

Limburg, K., E., O'Neill, R., V., Costanza, R., Farber, S., 2002. Complex systems and valuation.

Ecological Economics 41, 409–420.

Meyerhoff, J., Liebe, U., 2006. Protest beliefs in contingent valuation: Explaining their motivation. Ecological economics, In press.

Miller, G., 1955. The Magical Number Seven, Plus or Minus Two Some Limits on Our Capacity for Processing Information. Psychological Review Vol. 101, No. 2, 343- 52.

Mogas J., Riera P., Bennett J., 2006. A comparison of contingent valuation and choice modeling with second-order interactions. Journal of Forest Economics, 12, 5–30.

Munda, G., 2004. Social multi-criteria evaluation: Methodological foundations and operational consequences. European Journal of Operational Research 158, 662–677.

Munda, G. (2006). Social multi-criteria evaluation for urban sustainability policies. Land Use Policy 23, 86–94.

O'Connor, M., 2000. Pathways for Environmental Valuation: A Walk in the (Hanging) Gardens of Babylon. Ecol Econ, 34(2) 175–193.

O'Neill, J., 1993. Ecology, policy and Politics, human well-being and the Natural World. Clays, St Ives Plc.

O'Hara, U S., 1996. Discursive ethics in ecosystems valuation and environmental policy. Ecological Economics 16, 95-107.

Perkins, E., 2001. Discourse-based valuation and ecological economics, Annual Conference of the Canadian Society for Ecological Economics, August 23–25. McGill University, Montreal, Canada.



Pohekar, S.D., Ramachandran M., 2004. Application of multi-criteria decision making tosustainable energy planning—A review. Renewable and Sustainable Energy Reviews 8, 365–381.

Proctor, W., Drechsler, M., 2003. Deliberative Multi-criteria Evaluation: A case study of recreation and tourism options in Victoria Australia. In: European Society for Ecological Economics, Frontiers 2 Conference Tenerife, Feb 11-15.

Pykäläinen, J., Kangas, J., and Loikkanen, T. 1999. Interactive decision analysis in participatory strategic forest planning: experiences from state owned boreal forests. J. For. Econ. **5**: 3.

Renn, O., 2006. Participatory processes for designing environmental policies. Land Use Policy 23, 34–43.

Roy, B. (1978): "ELECTRE III: Algorithme de classement basé sur une représentation Saaty, T. L., Ozdemir, M.S., 2003. Why the Magic Number Seven Plus or Minus Two. Mathematical and Computer Modelling 38, 233-244.

Sagoff, M., 1998. Aggregation and deliberation in valuing environmental public goods: a look beyond contingent valuation. Ecol. Economics 24, 213–230.

Sen, A., 1995. Environmental evaluation and social choice: contingent valuation and the market analogy. Jpn. Econom. Rev. 46 (1), 23–37.

Smith, G., 2003. Deliberative democracy and the environment. Routledge & Taylor and Francis group.

Slovic, P., Griffin, D., and Tversky, A., 1990. "Compatibility Effects in Judgment and Choice." In Hogarth, Robin M., ed., *Insights in Decision Making: Theory andApplications*. Chicago: The University of Chicago Press.

Spash, C.L., 2000b. Ethical motives and charitable contribution in contingent valuation: Empirical evidence from social psychology and economics. Environmental values, 9, 453-79.

Spash, C.L., 2001. Deliberative monetary valuation. Paper for presentation at 5th Nordic Environmental Research Conference. Aarhus, Denmark, 14th – 16th June.

Spash, C.L., 2002. Informing and forming preferences in environmental valuation: Coral reef biodiversity. Journal of Economic Psychology 23, 665–687.

Springael, J., De Keyser, W., 2004. A new generation of multi-criteria based group decision support methods, 2004. in: Whistler, B. C. Canada August 6-11.

Tompkins, E., 2003. Using stakeholders preferences in multi-attribute decision making: Elicitation and aggregation issues. CSERGE working paper ECM 03-13

Vatn, A., 2004. Environmental valuation and rationality. Land Economics, 80 (1): 1-18.

Wilson, M., Howarth R.B. (2002). Discourse-based valuation of ecosystem services: establishing fair outcomes through group deliberation. Ecological Economics 41, 431–43.

Zhang Y., Li, Y., 2005. Valuing or pricing natural and environmental resources?





LANDSCAPE PLANNING AND MANAGEMENT STRATEGIES FOR ZIR VALLEY NEAR ANKARA IN TURKEY

Şükran ŞAHIN, Ülgen BEKIŞOĞLU

Ankara University, Faculty of Agriculture, Department of Landscape Architecture, Ankara University, Faculty of Agriculture, Department of Landscape Architecture TURKEY sahin@agri.ankara.edu.tr, ulgenb@yahoo.com

This paper is concentrated on landscape planning and management method for river basins in the example of Zir Valley in Ankara/Turkey using information technologies within the context of European Landscape Convention and European Water Framework Directive. Landscape planning is identified by European Landscape Convention (2000) as a strong forward-looking action to enhance, restore or create landscapes. By the same Convention landscape management is defined as an action, from a perspective of sustainable development to ensure the regular upkeep of a landscape, so as to guide and harmonize changes which are brought about by social, economic and environmental processes. The European Water Framework Directive (2000) is a set of guidelines for managing large bodies of water, and its principle action is to identify water bodies and the surrounding land area - these are called River Basin Districts.

A systematically constructed National Approach for River Basin Management, in the present work, and landscape planning and management method as its constructive part was explained in Zir Valley example using information technologies. The paper was constructed in following content: (i) Landscape characteristics of Zir Valley (ii) The environmental burdens created by human pressures (iii) Landscape Planning and Management Strategies.

Key words: River Basin, landscape planning, landscape management, European Landscape Convention, European Water Framework Directive

INTRODUCTION: Purpose and scope

The purpose of this paper is to suggest a "landscape planning and management" method for river basins in the scope of European Landscape Convention (ELC) and European Water Framework Directive (WFD) in the example of Zir Valley near Ankara in Turkey. The method was structured under the umbrella of a proposed "National Approach for River Basin Management" by this paper. The main inspirations of the paper are common landscape dimensions between ELC and WFD. ELC (2000) aims to promote landscape protection, management and planning, and to organise European co-operation on landscape issues, and Turkey has committed by law to execute all requirements of the convention by the official newspaper issued July 23, 2003 with N^o 25181. A *Landscape Protection Department* was formed under the Ministry of Forestry and Environment in 2003, and one of the primary tasks of the department is to develop a guideline to be used in defining the landscape characteristics of the county.



Article 5C of ELC about identification and assessment states that, "with the active participation of the interested parties, each Party undertakes: i) to identify its own landscapes throughout its territory; ii) to analyse their characteristics and the forces and pressures transforming them; iii) to take note of changes". In Europe, several methodologies are present for landscape characterisation, and still no consensus in defining common code in defining European landscapes.

The efforts on the implementation of the WFD in Turkey within the content of National Program for the Adoption of the Acquis are ongoing. The Article 1a of WFD (2000) states one of the purpose of the directive as prevents further deterioration and protects and enhances the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems. This mentioned purpose of WFD is aimed to integrate, by this paper, with landscape planning and management purposes taking into account only the terrestrial parts of the ecosystem to which surface water and ground waters depend upon. In other words, the chemical and ecological status of surface water and ground water are out of scope, no strategies produced for that landscape elements. Directive Member States are enforced by Article 13 to ensure that a river basin management plan will be produced for each river basin district lying entirely within their territory. Accordingly, river basin management plans is expected to cover the following elements by Annex VII as follow, of which the first tree requirements are the subjects of this paper.

- 1. A general description of the characteristics of the river basin district
- 2. A summary of significant pressures and impact of human activity
- 3. Identification and mapping of protected areas as required
- 4. A map of the monitoring networks
- 5. A list of the environmental objectives
- 6. A summary of the economic analysis of water use
- 7. A summary of the programme or programmes of measures
- 8. A register of any more detailed programmes and management plans
- 9. A summary of the public information and consultation measures taken
- 10. A list of competent authorities
- 11. The contact points and procedures for obtaining the background documentation and information

The river basins as physiographic landscape units can be considered the base of the landscape characterisation, so that the purposes of the ELC can be integrated with the purposes of WFD (2000) in which the final target is to reach the best ecological and chemical condition in European waters. Both ELC and WFD are their infancy period and there are lots to learn. The purpose of this paper is to integrate those two European intentions considering their landscape dimensions in common, so that integrate their targets into landscape planning and management efforts.



Ecological knowledge in landscape planning and management prerequisite to undertake all landscape analysis works within the ecological boundaries with the concern of maintaining the lifecycles of the earth. On the other hand, the ecological boundaries, or the limits of the landscape units, have lots of layers created by different ecosystem functions and structures changing in time and space. This chaotic can be overcome taking river basins as descriptive and administrative units for landscape planning and management purposes. Then, other ecological concerns can be overlapped with those basins to execute commitments of both ELC and WFD. This paper is aimed to example this suggestion in Zir Valley near Ankara.

Zir Brook of Zir Valey is accepted as a distinctive landscape unit from surrounding considering its site special characteristics without developing and executing an overall landscape characterisation method. The purpose of this paper is not to suggest a method for landscape characterisation as ELC prerequisite, but is to suggest a landscape planning and management method within the context of ELC together with WFD. Only natural landscape is of concern in this work since cultural landscape is out of scope in WFD, so that no any common part of it with ELC to integrate each other.

Lastly, landscape planning and management strategies with respect to the definitions by ELC were produced as an indispensable part of Strategic Landscape Planning of proposed "National Approach for River Basin Management" by this paper.

STUDY AREA AND METHOD

Zir Valley

Zir Valley (appr. 8 km) is located approximately 30 km far from Ankara though the west. Yenikent settlement is at northeast of the valley (Figure 1). Zir Brook is downstream part of Ova River. The valley presents distinctive landscape unit within the Murted Plateau of Ova River.

The distinctive landscape characteristics of the Valley were given below:

- Long, respectively depth and wide valley system distinct the study area from surrounding. In addition, interesting geomorphologic features, such as caves and rock formations that look like fairy chimneys are the add values for mentioned distinctiveness.
- Alluvial geological layer of the valley contain underground water which are very suitable for water extraction up to 25-30 m depth.
- Considerable population of White Vulture (*Neophron percnopterus*) ile Red Vulture (*Gyps fulvus*) which have conservation concern.
- Historically verified famous dense oak tree population of the valley were destroyed severely, only small patches remains up to now.
- Its closeness to city centre creates important potential to facilitate recreational demands. Also, it makes valley attractive for localization of industrial investments.
- Considerable cultural value by the means of its archaeological and historical assets
- Landfill area for solid wastes and water treatment area of Ankara city are located very close to the Zir Valley.
- Sand and stone extraction activities at valley destroy the visual landscape quality as well as wildlife habitats.



Landscape Planning and Management Approach

Planning approach developed by Şahin (1996 and 2002) was adapted to that work to recommend a model for landscape planning and management. The adapted method comprises of three integrated main frames (Figure 2): (i) River Basin Management Scheme, (ii) Strategic Landscape Planning, (iii) Holistic Assessment Method, which are the systematically constructed and integrated frameworks of mentioned National Approach for River Basin Management. Strategic Landscape Planning (SLP) indicates the steps that should be executed in land development decisions.

The SLP (Şahin 2002) consists of three steps with different sets of objectives as follows:

- Step 1: Landscape strategies
- Step 2: Landscape development plan land-use pattern development (site selection) via Holistic Assessment (HA)
- Step 3: Landscape management (including feasibility for investment projects)

The method called 'Holistic Assessment' within the framework of SLP determines capability or suitability of land for certain uses. "Conservation demand" considering ecological elements and processes of the area, and "development demand" considering self-sufficiency of the area in economic sense are the struggles for valuation of Holistic Approach (Şahin 2002). The "feasibility" for investment projects includes cost and benefit analysis for market and non-market (natural assets) values, and also an environmental impact assessment statement.







Figure 1: Study area

RESULTS

Landscape characteristics

Each landscape has a specisific set of keystone processes, a set that changes over time. There are five general categories of keystone processes that form landscape function and structure: geomorphological processes, climate change, colonization patterns and growth of organisms, local disturbances of individual ecosystems, and cultural processes (Forman and Godron 1986, Marrucci 2000). Each category potentially contains a wide array of actual keystone processes. There is no a priori means of identifying the keystone processes of a particular landscape. In this paper geomorphological processes and collonization pattern of organisms were studied.



Geomorphological processes refer to the creation of landforms (Ritter 1978; from Marrucci 2000) and its components. They involve crucial life cycles, plate tectonics, erosion, deposition, glaciation, etc. In this study the hydrological cycle was taken into account considering surface and ground-water content of the study area. For hydrological cycle, the aquifers recharge and discharge areas were analyzed. The method that was adopted from Buuren (1994) enables the identification of infiltration (aquifer recharge) zones, so that the areas that must be firstly preserved for the purposes of the continuity of hydrologic cycle as well as for the connectivity of fragmented landscapes of the area. The permeability of geological and soil structure of the study area were overlapped and mapped using GIS spatial analysis tools (Figure 2)



Figure 2: Landscape function regarding hydrological cycle

Colonization patterns and growth of organisms, may occur over long or short periods, and may be natural or anthropogenic. Because the biology of a landscape is such an important aspect of its ecology, the establishment of life forms plays a critical role in landscape evolution. All study area within the delimited boundary is at rural character and no serious disturbance regime considering ecosystem functioning, except river and riverine corridor. Disturbances/Pressures by human activities over connectivity are of concern.


Human pressures

WFD (2000) states that Member States shall collect and maintain information on the type and magnitude of the significant anthropogenic pressures to which the surface water bodies in each river basin district are liable to be subject. In that subject, ELC (2000) states along the lines of Article 5C that each Party should: (i) identify its own landscapes throughout its territory; (ii) analyse their characteristics and the forces and pressures transforming them; and (iii) take note of changes. Combining those statements of both regulation, human pressures at the study area can be summarized as follow:

- No ecological assessments or ecological status evaluations within the boundaries of river catchment and/or its micro-catchments.
- Habitat deteriorations by sand and gravel mining activities, trees clearance, hunting.
- Ground water consumption, and surface water pollution by industrial discharges

Landscape Planning and Management Strategies

a) National Approach for River Basin Management

Figure 3 shows the proposed National Approach for River Basin Management. The components of the Figure were explained followingly.



* Executed step by this paper





- Landscape Character Area (LCA)-named by the paper: ELC enforces each Party to determine the landscape characteristics of country. LCA resemble a character area that is suggested to determine considering river basins and river basin districts.
- **National Landscape Policy** –named by the paper: It is supposed to be constructed as a regulation to execute ELC.
- **River Basin District** named by WFD: Article 2 of WFD defines it as the area of land and sea, made up of one or more neighbouring river basins together with their associated groundwaters and coastal waters, which is identified under Article 3(1) as the main unit for management of river basins.
- **River Basin Management Plan (RBMP)** named by WFD: Article 13 of WFD states that Member States should ensure that a river basin management plan is produced for each river basin district lying entirely within their territory. Landscape Information System and Landscape Protection Strategies are required to prepare under the requisites of ELC, and they are supposed to be integrated with RBMP
- Administrative Unit –named by the paper: The board is supposed to develop, execute and monitor the requisites of the RBMP that will cover management program, information management and monitoring, and defining expected ecological status for the river bodies.
- **Strategic Landscape Planning**: Strategic landscape planning consists of the process of defining objectives related to the landcape conservation and development, and producing strategies to reach those objectives. WFD itself also can be considered as a set of strategic planning because of defining the objectives in accordance with the identification of reference conditions for the surface water body types to reach the best ecological states, and also setting priorities (measures) to reach the expected ecological states.
- National Platform: The main problem related with the water management in Turkey is the lack of coordination and cooperation among the competent authorities. The National Platform for Water Management was established in 2002 in Turkey to solve this problem, and the involved institutions are: State Hydraulic Works, Ministry of Environment and Forestry, Ministry of Agriculture and Rural Affairs, Ministry of Health, Ministry of Tourism and Culture, State Planning Authority, General Directorate of EU in Turkey, Others.

National and local level content of the scheme are summarized below:

1. National level

- Turkey has 26 main river basins, and those are grouped into six River Basin Districts with the approval by River Basin National Platform (Grontmij 2003). Mentioned Districts are considered as management units/administrative units for river basins, and River Basin Management Plans (RBMP) for each of them should be published by Member States of EU at the latest nine years after the date of entry into force of WFD. Although Turkey is not a member country, the requirements of the regulation is a scope of concerns in National Program for the Adoption of the Acquis.
- Landscape character areas should be integrated with the boundaries delimited for RBMP.
- The strategies to be stated in RBMP under the umbrella of WFD should be parallel with the landscape strategies to be produce under the umbrella of ELC.



- The data stored in proposed Landscape Information system should be easily accessible in the development of River Basin Management Plan.
 - 2. Local Level (in the example of Zir Valley)
- Landscape planning and management activities for such a landscape character area in local scale (Zir Valley scale) are suggested to produce within local scale micro-catchment area like as shown in Figure 2 with strong consideration of and integration with upper and lower scale environmental conditions, decisions, plans, programs, etc. The valley itself were accepted as a distinctive landscape character area, and it is integrated with the approach of taking river catchment boundaries into consideration as a planning area

b) Landscape Planning strategies

- The continuity of the landscape should be ensured by the conservation, enhancement and improvement of the landscape structure and function. In that sense Figure 4 shows the areas of importance.
- Ecological integrity should be provided with ecological network creation. Creation of ecological network makes ecological processes more efficient, protects the integration with near environment, maintains the hydrologic system, enhances biological diversity and comforts the species movements (Zonneveld 1994).
- c) Landscape management strategies
 - A landscape information system (cyber-landscape) should be created integrated with the national information system which is under construction through the e-government program in Turkey.
 - The river water quality should be managed and human pressures should be controlled via implementation of existing laws and regulations.
 - Landscape planning and management activities of Zir Valey and brook itself should be administrated by Local Authority. Considering existing regulation, Environmental Plans at 1/100 000 scale are the convenient tool to develop landscape conservation strategies.
 - Historically verified famous dense oak tree population of the valley were destroyed severely, only small patches remains up to now. Re-vitalization of oak population at valley should be implemented in the areas of vegetation cover improvement.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



Figure 4: Planning strategies

DISCUSSIONS

The paper asserts its contributions with the following subjects:

- Integration of ELC and WFD via common landscape dimension of them, accordingly
- Structuring National Approach for River Basin Management, within its context
- Structuring Landscape Planning and Management process
- Landscape character areas definition via key stone processes and micro-basins

Acknowledgement

The authors present their thanks to Dr. Figen Dilek and Research Assistant Işıl Çakçı for their very valuable contributions in the preparation of the landscape inventories of study area which were used in student essays for Landscape Planning Studio in 2003 at the Department of Landscape Architecture, Ankara University.



REFERENCES:

Buuren, M. van (1994), The hydrological landscape structure as a basis for network formulation; a case study for the Regge catchment-NL. In: Landscape Planning and Ecological Networks" edited by E.A.Cook and H.N. van Lier, Elsevier Science, The Netherlands.

Forman, R.T.T. and Godron, M. (1986), Landscape Ecology. Wiley, New York.

Grontmij (2003), Su Çerçeve Direktifi'nin Türkiye'de Uygulanması: Uygulama El Kitabı, Grontmij Advies & Techniek bv Vestiging Utrecht Houten.

Marcucci Daniel J. (2000), Landscape History as a Planning Tool. Journal of Landscape and Urban Planning, 49.

Şahin, Ş. (1996), Dikmen Vadisi Peyzaj Potansiyelinin Saptanması ve Değerlendirilmesi Üzerine Bir Araştırma, Ankara Üniversitesi, Fen Bilimleri Enstitüsü, Doktora Tezi.

Şahin, Ş. et al (2002), Sürdürülebilir Peyzaj Planlama Kapsamında Mersin Kıyı Bölgesinin Turizm Açısından Değerlendirilmesi, A. Ü. Araştırma Fonu Destekli Proje.

Zonnoveld I. (1994), Landscape Ecology and Ecological Networks. In: Cook Edward, A. and van Lier Hubert, N. (Eds) 1994. Landscape Planning and Ecological Networks. ELSEVIER Science B. V, ISBN 0-444-82084-1. The Netherlands.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



CULTURAL COLLISION AND PATTERN RECONSTRUCTION OF NATIONAL FOREST PARK IN METROPOLIS A CASE STUDY IN ZIJIN MOUNTAIN, NANJING

LI MINGYANG

College of Forest Resources and Environment, Nanjing Forestry University, Nanjing 210037, Jiangsu, CHINA Imy196727@126.com

The fragmentation of cultural landscape, decrease of biodiversity, loss of water and soil, decrease of aesthetical value of recreational forest, nibbling of forest land are common environmental problems harassing many Chinese national forest parks, which menace the sustainable development of forest park. Zijin Mountain is chosen as the case study area and the collision between tomb culture, ecological culture, country culture, urban culture are analyzed in detail to find out the deep-rooted causes of the environmental problems with a clue of history succession. Then, data from forest inventory and high resolution image of QuickBird as well as results of forest aesthetic evaluation are collected to do functional division of the forest park on the spatial analysis platform of ArcGis 9.0 and ERDAS 8.7. Five sub-zones entitled Northern Forest Traveling Sub-zone, Natural Conservation Sub-zone, Ridge Ecological Protection Sub-zone, Historical Heritage Sites Sub-zone, Southern Recreation Sub-zone for Local Residents are divided. By applying the method mentioned above, the conflicts among different cultures can be solved harmoniously, and an approach leading to the sustainable environmental conservation in regions of high historic and cultural values is found.

Key words: Cultural collision; Pattern reconstruction, Zijin Mountain, Functional division

1. Introduction

Zijin Mountain is located in the eastern suburb of Nanjing



Fig 1.QuickBird Image of Zijin Mountain in 2004



City (118°48'00" ~ 118°53'04"E,32°01'57" ~ 32°06'15"N), Jiangsu province, P.R. China, with a span of 7.11 km form east to west and 6.17 km from north to south. The shape of the mountain looks like a diamond with a total area of 3008.8 hm²(Fig.1). The highest peak of the mountain is named the First Monk Range, with an altitude of 448.8m above sea level. Situated in the transition belt between north subtropical zone and warm temperate zone, and with great variety of plants and high forest coverage, the mountain is an ideal habitat of wild plants and animals[1]. On 1st March, 2004, the mountain was changed into a national forest park by State Forestry Service. With the highest peak in Nanjing prefecture and vertical cliffs, it is looked like a swimming dragon in distance. Influenced deeply by traditional Chinese geomancy, the mountain has been chosen as the holy place to build imperial toms and Buddhism temples since Three Kingdoms (220 AD) in China history. Since the Reform and Open to Outwards in 1978, the mountain has been changed from an outskirt scenic area into an inner city forest park, totally altering the management direction and characters of the park. Under this situation, the singular function of the tomb culture in the park can not meet the expanding demands of local residents, such as recreation, forest cultivation and biodiversity conservation. With the rapid increase of living standard of Chinese people and development of tourism, severe ecological environmental problems of fragmentation of cultural landscape, loss of biodiversity, loss of soil and water, together with air pollution and decrease of forest aesthetic value, have been emergent [2]. In the paper, national forest park of Zijin Mountain is selected as case study area and the source of the environmental problems are analyzed from the point of culture collision. Geomatics tool of ArcInfo and ERDAS are used and functional zones are divided to find a way leading to sustainable management of urban forest parks in metropolis.

2. Tomb and temple Culture ——Zijin Mountain in history

From ancient times, Zijin Mountain has been one of the four famous mountains in Southern China , namely Mount Heng Mount Lu, Mount Mao and Mount Zhong (the alias of Zijin Mountain). With a huge body comprised of many peaks, sleeping in the eastern suburb of Nanjing City like a swimming dragon, covered with diversified plant species, the mountain constitutes a splendid scenery. Early in the Three Kingdoms period (220-280AD), the Shu Kingdom prime minister Zhuge Liang (a prominent militarist in ancient times and an embodiment of wisdom) was sent to Nanjing to negotiate with Wu Kingdom to make a coalition to fight against common enemy Wei Kingdom. After he had made a field survey of the climate, topography and geography of the city, he had a saying: "The mountain looks like a sleeping dragon and the stone wall resembles a sitting tiger. What an ideal place it is to build a capital for an emperor or a king !" Since then, Swimming Dragon and Sitting Tiger has become the byname of Nanjing City, making the Zijin Mountain being famous in China and abroad. Influenced deeply by traditional Chinese thoughts of geomancy, the mountain has become the land of heaven for building tombs and temples since Six Dynasties (317 AD).



2.1Tomb culture

Dread of death is a spontaneous reaction of living things, especially human beings. Power, money and honor in unreligious world sharpen the frightening feeling of being dead and enhance the wish of living forever. Standing on the peak of richness and honor pyramid, the feelings of the emperors and kings of being reluctant to death and willing to living forever are more acute than common people. Under the influence of the thoughts about death and life, many magnificent imperial tombs with elaborate designs were built to lessen the acute feelings. Deeply rooted cultural meanings can be inferred from detailed designs of the tomb buildings, such as the overall layout and decoration styles, characteristics of burying rooms and accessorial constructions above ground. The main contents of the tomb culture can be condensed to such phrases as following: "Soul still living after people's death", "Died people having ranks of high and low", "The ghost be served as the alive", "Extravagant burial meaning piety", "The decreased ancestors bring fortunes to pious offspring", etc [3].

During the period of Three Kingdoms, Sun Quan, the founder of Wu Kingdom, selected Nanjing as the capital of his country with the unique foresight, thus became the first emperor in Nanjing history. In 252 AD, Sun Quan was buried under Plum Blossom Hill, in the southern slope of Zijin Mountain. Below the Unique Dragon Hill in the southern Zijin Mountain, is Filial Tomb of the Ming Dynasty, the tomb of emperor Zhu Yuanzhang, the founder of Ming Dynasty (1368-1644AD). Filial Tomb of the Ming Dynasty is one of the biggest existing tombs of ancient emperors in China history. Along the northern border of Zijing Mountain, below the altitude of Filial Tomb of the Ming Dynasty, buried many generals and ministers who had made outstanding contributions to the foundation of Ming Dynasty, such as Zhongshan King Xu Da, Kaiping King Chang Yuchun, Qiyang King Li Wenzhong. Standing at the middle point of the southern Zijin Mountain, is the most famous Dr. Sun Yat-sen's Mausoleum. Inheriting the merits of Chinese traditional tomb architecture, Dr. Sun Yat-sen's Mausoleum was also comprised such components as archway, sacred avenue, mausoleum gate, stele pavilion, memorial hall. At the same time, some constructions which were built to manifest the dignity of emperors, such as stone warriors and beasts were regarded to be feudalism garbage and omitted. While a few advanced architectural technologies from western countries were assimilated into the building of mausoleum.

After Dr. Sun Yat-sen's Mausoleum was built, some of the Kuomintang Party members, who had closely followed Dr. Sun with revolutionary course for several years, regarded it was an honor to be buried around Dr. Sun's tomb. In 1929, the central committee of Kuomintang Party built the Sacrificial Hall for revolutionary martyrs on the relic of formal Linggu Temple. In 1933, Tan Yiankai, the formal chairman of Kuomintang Party, was buried to the northeast of Linggu Temple and the tomb of Liao Zhongkai, the patriarch of Kuomintang was constructed to the west of Sun Yat-sen's Mausoleum in 1935. In 1957, on the remains of the second cemetery of revolutionary martyrs, the tomb of Deng Yanda (the founder of the Democratic Construction Party) was built. Besides these tombs, several revolutionaries, such as general Fan Hongxian and Han Hui, were buried around Sun Yat-sen's Mausoleum, too. Wang Jingwei, the president of puppet government during the war of Anti-Japanese aggression (1937-1945), and Dai Li, the head of Kuomintang Information Bureau, were also buried in Zijin Mountain.



But their tombs were blown down by angry people soon after the tomb were completed. It is worthy to mention that, in November 1946, Jiang Kaishi, the president of former China, selected himself a tomb site on the slope above Zixia Lake, which was between Sun Yat-sen's Mausoleum and Filial Tomb of the Ming Dynasty. However, he could not wait the moment he was buried before his regime was overthrown and he was forced to flee to Taiwan.

According to the teachings of traditional Chinese geomancy, mausoleum has the ability of lighting the fire of revival by means of diversified symbolized layout, thus lessening the misery of being died and fulfilling the unrealized wishes of dying people. From this point of view, tomb culture has a mentally consoling function. Being of this function, tomb culture may continue to exist for a long time before human solve the dread of death thoroughly [4]. Therefore, tomb culture mainly comprised of Sun Yat-sen's Mausoleum and Filial Tomb of the Ming Dynasty constitutes the body of cultural tourism resources.

2.2. Temple culture

While the tomb culture reveals the traditional Chinese views on life and death, temple culture symbolizes the traditional Chinese attitudes towards man and ghost. Being the place for practicing religious rituals and cultivating one's morality, a temple should to be built at a site which is convenient to live a worldly life but is somewhat secluded like a fairyland. By selection of building sites, making of overall layout, spatial processing, choosing of accessorial constructions and dealing with the relationship between temple and environment, a temple become a symbolized paradise for common people to escape the vicious worldly society[5]. The people with high position in China history, who could not realize their hopes and feel the real meaning of life in unreligious world, discarded their original wishes in physical world and turned to temple for pursuing a poetic life in spiritual world. Looking at the blossoming flowers, climbing the hills and listening to the tweeting of birds in quiet temples, they could meditate undisturbed and discovered something of permanent meanings [6]. During the period of warring, Buddhist teachings such as "Doing good things bit by bit and virtue accumulated eventually", "Everyone born equal whatever his social status", "Cause and consequence interlinked"," Bearing tortures alive and going to paradise after death", had the function of purifying people's soul, especially to the common people trapped in the miserable hell of war and natural disasters [7].

During the period of North and South Dynasties (420-581 AD), Buddhism was pervasive in Nanjing area. There was a poem entitled "Seeing Spring in Southern China" made by poet Du Mu of Tang Dynasty (618-907AD), which vividly described the magnificent scenery of Buddhist temples in the region. The poem said that there were over 480 temples standing in the mist and drizzle of spring Nanjing. According to the historical records, more than 500 temples were built in Nanjing district at that time. There were over 100,000 monks and nuns living in these splendid temples which possessed large patches of estates and farm land. In fact, about 70 temples were set up in the neighborhood of Zijin Mountain at that time, of which Linggu Temple was the largest in scale. Original, the temple was the burying place of a famous monk named Baozhi in South Dynasty. Then it is named Kaishan Temple in Liang Dynasty, Baogong Temple in Tang Dynasty and Taiping Xingguo Temple in Song Dynasty respectively.



At the beginning of Ming Dynasty when Filial Tomb of the Ming Dynasty began to build, the emperor Zhu Yuanzhang, ordered the temple be moved to another place and gave the temple new name Linggu Temple. By the end of Ming Dynasty, the temple reached to its peak and became the No.1 temple in the country, having 500 monks altogether, ruling over 12 temples included Xixia Temple, owning 2,292 hm² area of farmland, mountain and lakes.

After Ming Dynasty was replaced by Qing Dynasty (1644-1911AD), the temple suffered several severe damages in the war and most of the temple's buildings were burned down, only leaving a small corner named Dragon Temple which was today's Linggu Temple. In 1929, a sacrificial hall for revolutionary martyrs was built on the relic of formal Linggu Temple. Today's Linggu Temple is much smaller than the original one and has been transformed into a recreational park for local inhabitants in which it is difficult to find the historical clues among pines, cemetery and entertainment facilities. Present temple gets much shabby and the traffic condition is not convenient, making the number of people going to worship decrease these years. Short of money from religious people, temple culture loses its economical base and has to give its place to mausoleum culture and recreational culture.

3. Impact of urban culture based on industry civilization

After mid-1990s, with the implementation of overall plan of Metropolis Nanjing, Zijin Mountain is gradually surrounded by factories and tall buildings and converted into inner city forest park. With the widespread of urban culture based on the industry civilization, tourism is bringing about more and more threats to mausoleum culture. At the same time, the mountain's function of public green land is enhanced greatly to meet the entertainment need of local residents. Under such conditions, the sparsely distributed villages in the mountain have no reasons to exist any longer. When the outskirt renovation plan of Zijin Mountain is being carried out, it is the time for the agricultural culture to vanish.

3.1. Impact of urban culture on mausoleum culture

The mechanistic world view of contemporary urban culture is built on the foundation of modern physics and mathematics. The cultural value is subjective and gradually evolve into an orientation of human-centered. On the relationship between man and nature, urban culture breaks the link of man and nature and regards the nature as passive and mechanic existence having no inherent values. Under the guideline of urban culture, with the rapid development of tourism, tomb culture has been badly damaged and severe eco-environment problems have been taking place [8].

As one of the backbones of tourism in Nanjing, a lot of money has been invested to renovate and develop Zijin Mountain in recent years. With big hotels, large meeting centers and other travel shops being set up, the salient features of integration and symmetry of mausoleums are destroyed as the service conditions being improved. Besides, cultural atmosphere is polluted and forest which has been acting the background of the mountain is damaged.



After foundation of P.R. China, Nanjing Watch Factory and other enterprises have been set up in the area from Great Gold Gate to Getting-off Horse Archway, damaging the integration of Filial Tomb of the Ming Dynasty. By the end of 1990s, sacred avenue of Filial Tomb has become the main transportation hub which connects Zhongshan Gate and Taiping Gate, dividing the mausoleum area into three separate pieces. While the cultural value being decreased, poisonous air emitted by moving cars brings about many damages to tomb construction [9].

With the rapid development of tourism, the square of Sun Yat-sen's Mausoleum becomes the joint at which tourists, cars, shops assemble. Huge numbers of people, crowed transportation, noisy open shopping malls, all are not compatible with the solemn atmosphere of the mausoleum. On the Labor Day and National Day, hundred of thousands people swarm into the mausoleum, bringing many damages to tomb road, memorial hall and burying room.

As an open forest park, the forest ecological environment is also impaired greatly by traveling activities of local residents. Owing to the hunting by climbers, shortage of water resources and deserted plastic bags, the wild animals living in the mountain, such as *Hydropotes inermis, Mustela eversmanni, Milogale moschata* and *Erinaceus emurensis* are facing the fate of extinction. While climbing the mountain, some tourists get the bad practice of peeling the bark of pine trees along the mountain road, which makes many trees dying. In spring, large numbers of local residents like to climb mountain to pick up potherbs and greatly reduce the number of shrubs in the forest, making the mountain being apt to the risk of soil erosion and water losses. In winter, the management department of the mountain mobilizes many people to clean the shrubs and plant trees, destroying the habitat of a native butterfly which lives in the shrub of *Asarum forbesii*, and putting the butterfly *Luehdorfia chinensii* at the edge of extinction [10].

3.2. The end of country culture based on agricultural civilization

In agricultural society, people's genius can not exert to its full extent because of low productivity and being subordinate to nature. The main goal of human beings is to make the society orderly, harmonious and stable to meet the basic needs of population. There are two features of country culture: one is to dread of the nature's force, the other is to emphasize the integration of nature and society. The main characteristic of traditional agricultural civilization is the low input and low output with less energy consumption. This production mode can build a rational inner cycling economy at the expense of exterior uneconomical to both society and ecology. With the advent of urban culture, the country culture gets more fragile and is apt to die out. With huge population and little arable farmland in Jiangsu Province, farmers have inhabited in the Zijin Mountain for generations since ancient times. According to the statistic from Inventory and Evaluation of Resources in Sun Yat-sen's Mausoleum made in 1986, there were 5677 farmers who occupied 412.7hm² arable lands to grow vegetable and fruit trees. After 1978, many of the farm land was changed into commercial and residential land on which top grade buildings and shopping centers were built with the identity conversion of farmers to urban citizens. Remaining farmers live in sparsely distributed villages and continually to work in the way as their ancestors, bring about environmental and visual pollution to the tourism and damaging the images of the natural park.



In February 2004, a decree was issued by municipal government that more than 4 billion RMB should be invested to renovation the forest park to make mountain emergent, to make water green and wall unveiled. In August 2004, the Outskirt Planning of Zijin Mountain made by American famous landscape design company EDAW, was made public in Manjing Science Exhibition Hall. The residents of 3729 households living in 13 villages and 31 factories were ordered to move out of Zijin Mountain. The current farm land and construction sites will be changed into green land on which six thematic parks are going to be built, such as Sun Yatsen Sports Park, Ethnic Custom Park, Heaven and Ground Science Park. The disappearance of villages and building of urban thematic parks mean the end of agricultural culture.

4. The arising of ecological culture and pattern reconstruction

The world view of ecological culture is based on the research of ecology and systematic science. Its value is a combination of ancient integrated culture and contemporary subjective cultural, emphasizing the harmonious development of man and nature. The collision between different cultures manifests that there are different stakeholders in the land utilization of Zijin Mountain. Under the guideline of ecological culture, the demands of different stakeholders must be considered and spatial functional division should be done. Thus an approach leading to the sustainable environmental conservation in regions of high historic and cultural values is found.

4.1. Data

(1) Digital forest distribution map made in 2002, including 71 forest compartments, 667 forest sub-compartments. Besides conventional sub-compartment attributes such as site type, forest type, tree species, diameter at breast height, average tree height, there were also other attributes such as aesthetical grade in the sub-compartment attribute table. Two attributes of centroid X and centroid Y were added by means of GIS software function of Update Column.

(2) Remote sensing data of QuickBird on July 4, 2004, including one panchromatic band and four multi-spectral bands. Spatial resolution of panchromatic band is 0.6×0.6 m, while multi-spectral band is 2.4×2.4 m.

4.2. Software

(1) Remote sensing software Erdas 8.7. Manipulations of resolution merge, natural color change, de-correlation stretch, subset image are completed on the platform of Erdas 8.7.

(2) Desktop GIS software MapInfo Professional 7.8. Creation of Centroid X, Centroid Y and shape point file, addition of fields biomass and aesthetical grade to the attribute table, conversion of TAB file to Shape are accomplished on the platform of this software.



(3) ArcGis 9.0 developed by ESRI. Creation of biomass layer and aesthetical layer, data reclassification, raster calculation are done with the module Spatial Analyst of ArcGis 9.0. While division of management sub-zones, overlay of the boundary of sub-zone and QuickBird image are carried out with the modules of ArcCatalog, ArcMap of the software.

4.3. Method

The demands of different stakeholders, such as local citizens, tourists, cultural relic conservation officials, forestry workers and environment groups, can be generalized into two classes of ecological and aesthetical functions. The ecological function can be represented by the value of biomass, while the aesthetic function can be evaluated by the grade of aesthetic value. The sum of ecological function and aesthetic function reveals the overall service function of the park and can be used to partition park space. Therefore, the technical route of functional division can be summarized as following: Creation of shape point files—→Conversion of stock volume to biomass—→Creation of biological layer and aesthetical layer —→Overlay of two layers and reclassification of raster data —→Mouse tracking and making of division draft —→Regulation of sub-zone boundary —→Formal scheme of functional division.

5. Results and analysis

5.1. Analysis of spatial division in 1982



Fig.2 Spatial Division of Zijin Mountain and in 1982 Aesthetical Function



Fig.3 Spatial Division Based on Ecological

Restricted by both the IT and social-economical development level, there are some weaknesses in the spatial division of Zijin Mountain in 1982 [11] (Fig. 2): (1) The function of the park is very singular, only including forest management (Sub-zone1), protection of cultural relic (Sub-zone 3) and agricultural production(Sub-zone 4), not considering the functions of recreation for local residents, protection of biodiversity, and conservation of eco-



environment. (2) The area of agricultural production sub-zone was 645.05 hm², comprising 21.75% of total park, which conflicted with the main function of the high grade national forest park and violated the current regulation of the state law concerned with the management of scenic park.(3) Forest cultivation sub-zone was comprised of two separate pieces of land and the southern one with the area of 68.73 hm² was falsely located on the campus of Nanjing Sports College. It was obvious that there was a mistake when doing spatial division. (4) The management goals of three separate pieces of land (Sub-zone 2) which were formerly used by farmers to grow vegetables and breed fish were not defined. The practice was in contradiction with the stipulation of doing spatial division in forest park.

5.2. Division scheme based on ecological and aesthetical functions

Shown from Fig. 3, from north to south, there are five management sub-zones partitioned in Zijin Mountain, entitled Northern Forest Traveling Sub-zone, Natural Conservation Sub-zone, Ridge Ecological Protection Sub-zone, Historical Heritage Sites Sub-zone, Southern Recreation Sub-zone for Local Residents, represented by Roman symbols I, II, III, IV, V respectively. The Northern Forest Traveling Sub-zone is located on the middle and low part of the mountain with an area of 1011.35hm². The dominant forest types in this sub-zone are broad-leaved trees mainly comprised of Quercus acutissima, Liquidambar formosana and bamboos in which a few famous scenic spots such as Cemetery of Aviation Martyrs, Friendship Reservoir of Soldiers and Citizens. The main management goal of the sub-zone is to improve the level of forest management to create a good environment in which local residents can hike on foot, climb the mountain, swim and row in the reservoir, and draw pictures in the forest. Natural Conservation Sub-zone lies on the upper part of the mountain, with an area of 280.87 hm². The sub-zone is comprised of dense forest and is far from transportation center or residential communities, providing an ideal habitat for several wild mammals. So the management objective of this sub-zone is to forbid tourists to enter freely to decrease the disturbance from human beings while doing research on wild animal protection. The area of Ridge Ecological Protection Sub-zone is 217.84 hm² and the sub-zone is situated in the area along the mountain ridge with steep slopes and poor soil. Trees such as Pinus massoniana and Pinus thubergii can not grow well under this soil condition and the risk of soil erosion and water loss is high. Therefore the management goal for this sub-zone is to improve the soil condition and plant more trees. Sun Yat-sen's Mausoleum, Filial Tomb of the Ming Dynasty, Linggu Temple, Plum Blossom Hill, Zixia Lake and other famous scenic spots in Zijin Mountain are gathered in Historical Heritage Sites Sub-zone which is with an area of 734.22 hm². The major management task of this sub-zone is to increase the aesthetic grade of forest to attract more tourists in China and abroad. The area of the last sub-zone is 818.57 hm² and is currently occupied by farmers and factories. With a low forest coverage and clusters of disordered flats, the sub-zone is criticized by public for its poor hygiene conditions and deteriorated environment. Thus the main task of this sub-zone is to demolish the disordered buildings and change the remaining land into gardens at which local residents could entertain themselves in spare time. According to the Outskirt Planning of Zijin Mountain, there will be six city parks built in this sub-zone, including Plum Valley Wetland Park, Getting-off Archway and Sun Yat-sen Sports Center.



6. Conclusions

Historically, as an important component of traditional Chinese culture, tomb culture and temple culture had taken a dominant role in human tourism resources in Zijin Mountain. With the alternation of feudal dynasties, change of regards paid by different emperors, and impact of wars, temple culture fell from its peak in late Ming Dynasty to the lowest point now. In such a circumstance, tomb culture become the only component of tourism resources and could not meet the various cultural demands of people. After Reform and Open Outwards in 1978, with the rapid development of urbanization, the mountain has become the isolated island in the ocean of tall buildings and large shopping centers and many eco-environment problems have been emergent. With a clue of history succession, the collision between tomb culture, ecological culture, country culture, urban culture are analyzed in detail to find out the deeprooted causes of the environmental problems. Then, geomatics tools are used to do functional division to reconstruct spatial pattern in the research area to coordinate the conflicting stakeholders. Thus an approach leading to the sustainable environmental conservation in regions of high historic and cultural values is found. It is a brave trial to probe the deep-rooted causes of the eco-environment problems from the point of culture collision and to coordinate the conflicting stakeholders by means of doing spatial division on the platform of geomatics softwares. It is sure there are some weaknesses on theoretical bases and technical route of the method used in the paper. The main object of this paper is to interest people to pay more attention to the eco-environment problems of the national forest parks during the process of urbanization in developing countries.

REFERENCES:

- [1] Yang Zhijiang. 2002. Mountain, Water and Historical Sites of Ten Dynasties in Nanjing. Resources Inventory and Environment. 23(4):299-310
- [2] Xu Haibing, Yu Jinbao, 2004. Wan Zhizhou. Investigation and Analysis of Dynamic of Forest Resources in Dr. Sun Yat-sen's Mausoleum. Forestry Science and Technology in Jiangsu .31(1): 9-11
- [3] Jv Yueshi. 2004. Cultural Interpretation of Imperial Mausoleums. Journal of Tongji University (Edition of Social Science).15(5):12-15
- [4] Zong Xian. 1997. The Salient Features of Cultural Psychology of Chinese Tombs. Observation of Fine Arts. (1):49-51
- [5] Li Xiangshu. 2001. Ideal Landscape Mode of Chinese and Temple Garden. Human Geography.16(1):35-39
- [6] Zhao Ming.2004.Zhang Jie. Probe of Impact of Traditional Thoughts on The Layout of Temple Garden in China. China Garden, (9):63-65
- [7] Guan Xin. 2006. The Creation of Artistic Conception in Chinese Buddhist Temple. Anhui Agriculture University (Edition of Social Science).15(2):116-119
- [8] Chen Hongbing, Yi Xin.. 2006. The World View and Cultural Value Orientation of Ancient Culture, Contemporary Culture and Ecological Culture. Forum of Eastern. Mountain. 27(2):175-178
- [9] Yang Hongwei. 2002. Systematic Analysis and Pattern Reconstruction of Dr. Sun Yat-sen's Mausoleum. Research of Contemporary City. (2):9-13



- [10] Li Mingyang, 2005. Xiong Xianquan, Yang Jinsong. Dynamic of Landscape Pattern of Scenic Forest in Zijin Mountain. Central South Forestry Inventory and Planning.24(4):23-26.
- [11] Administrative Bureau of Dr. Sun Yat-sen's Mausoleum. 1986. Forest Management Plan of Dr. Sun Yat-sen's Mausoleum. Administrative Bureau of Dr .Sun Yat-sen's Mausoleum, 27-28



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

GEONOMICS: BOOTSTRAP DEVELOPMENT FOR A SUSTAINABLE PLANET

Jeffery J. SMITH

President, the Geonomy Society Representative to the United Nations from the International Union for Land-Value Taxation and Free Trade c/o Ambassador Yuri Pavlov, 10731 SE Center St, Portland OR 97266 USA jjs@geonomics.org

Some peoples pulled themselves up by their own bootstraps, without relying on trade or aid, thereby enabling sustainability. These self-developers used "geonomics"; they recovered "Ground Rents" and diminished taxes upon production, a method proposed by a UN body (Commission, 1996). Most of these self-starters taxed private land (rather than buildings, business, or income), a reform cited by the UN (Preparatory, 2002). A few bootstrap jurisdictions instead leased public land. Since society, not by the owner, generates the market value of sites and resources, recovering and sharing it rests on firm moral ground.

Ground Rents, or Natural Rents, are a social surplus, since no one needs to pay anyone to create Earth. They're the monies people spend on the nature they use, the money paid periodically or in a lump sum, to a private owner or lender or a public agency, to own or use sites, resources, the broadcast spectrum, or the environment as a sink for pollutants. Recovering such Rents (measurable by Ricardo's Law), in lieu of taxing effort, empowers people to prosper for two reasons. As in the old story of the donkey and its driver with the carrot and the whip, recovering Rent spurs people to produce while zeroing out taxes lures people to produce. People who produce sufficiently are more ready, willing, and able to produce sustainably.

As informed observers keep repeating, widespread ownership of land is a basic prerequisite for development. While this paper was written (2002 February), the 2000/2001 Annual Report of the Church Development Service, the Earth Negotiations Bulletin of the International Institute of Sustainable Development (2002 Jan 31), and the Forum Declaration by the Norwegian delegation to the World Summit all called for land reform to eradicate poverty. At least four times in history, people did that, without bloodshed, following the collection of Rent. While these four jurisdictions did more to help tenants become owners than just tax land, recovery of Rent did play a key, yet often overlooked, role.



Self-Development Worldwide

In Denmark in the 1840s, an idealist king, Frederick, was finally able to persuade nobles to accept a tax on land value. Denmark achieved the highest percentage of family owned farms in Europe and a reputation for their dairy products (Silagi, 1994). In California in the 1890s, an idealist schoolteacher was able to persuade the state legislature to permit localities to levy a land-value tax (LVT). While the reform lasted, enormous ranches were converted into tens of thousands family farms. California became known as the "breadbasket of America" (Henley, 1957). In Australia and New Zealand before 1910, settlers legislated a national land tax, which broke up huge holdings into many smaller, self-sufficient farms (Woodruff, 1969). In these cases and in Taiwan in the 1940s and 1950s, when big landowners had to pay more Rent via the higher tax, they found it no longer worth their while to be a middleman, so they sold off their excess holdings to their former tenants at prices the farmers could afford.

The poster child for development is Taiwan, which set the world record for rapid and continuous growth. When the Nationalists took refuge on the island, they implemented the land reform that they had merely promised on the mainland. Working for themselves on their own land changed farmers; they worked harder and smarter, producing a surplus that enabled them to buy goods manufactured in the city, made in factories by sons no longer needed on the new, more efficient farms (Harrison, 1983). Taiwan's development has not been sustainable; the ruling party, which made itself into the richest one on earth, blithely despoiled the environment. While in power, they failed to uphold one's right to Earth in a healthy condition and did not charge polluters (their own factories) for the costs they imposed.

With Taiwan, the other well-known success story is Costa Rica. This Central American nation enjoys widespread ownership of land not due to agrarian reform or a tax on extensive holdings but merely to historical accident; the indigenous population refused enslavement to the colonizing Spaniards and the topography is largely mountainous, both factors militating against the establishment of latifundia. Costa Rica shows the power of widespread ownership of land. Today, tho' it has slid backwards since the late 1980s Contra War waged on its western border drove millions of poor Nicaraguans to take refuge in Costa Rica, the country still has proportionally the biggest middleclass (the source of many environmental activists) (Busey, 1992) and the lowest crime rate in Latin America (Pan American, 1997). A stable democracy, Costa Rica was the first to abolish its army (followed by neighboring Panama); an army is a huge drain on the public purse.

Other regions that developed by utilizing a tax on land values (the levy left after shifting the property tax off buildings) include towns in western Canada, South Africa, Australia, and in New Zealand. Towns that thus recover Rent tend to have more owner-occupants, paved streets, parks, higher voter turnouts, even town hall meetings to set policy. None of them have the slums that afflict US cities. (Andelson, 2000)



South Africa's Johannesburg, which began as a mining town, was rapidly becoming a ghost town when the ore was played out early last century. To avoid such a fate, the city fathers shifted their property tax from buildings to land, rescuing their town. Johannesburg grew to become the financial capital of the nation, eclipsing Cape Town, a port situated on one of the most strategic points on the planet, which taxed land and buildings equally. It was as if Canberra had out-developed Melbourne or Sydney. (Dunkley, 1990)

In Australia around Melbourne, about half the suburban towns taxed only land, half taxed both buildings and land. Those towns that taxed only land enjoyed about 50% more built value per acre (Lusht, 1992). During the recession of the second half of the 1970s, early 1980s, the towns taxing buildings lost business while the land-taxing towns gained new businesses. (Bennett, 1996)

Most of these examples have a land tax in lieu of other, punitive taxes not for reasons of ideology or foresight but of simple common sense. At the beginning, when a colony is founded, very little else but land exists liable to taxation; there's not much in the way of sales or incomes or buildings. An alternative to the government selling off its newly claimed land is to retain it and lease it, as did Hong Kong (since the land was the Crown's for only 99 years). A mere rock in the sea lacking every resource but a harbor, Hong Kong nevertheless grows much of its own food and outperforms every other city on China's coast. By recovering so much Site Rent, it keeps taxes low. Low taxes translate into low prices, high investments, and high incomes. Hong Kong, whose metro operates profitably sans subsidy, often ranks as the wealthiest city in the world per capita, the freest by libertarians, and has often been voted the world's best city for business by FORTUNE magazine. (Fitch, 1993)

Bootstrap Development In the U.S.

A bit more than a century ago in America, a reformer named Henry George earned a huge following by arguing for a single tax on land value. After his death, his followers founded three colonies: Free Acres, New Jersey; Arden, Delaware; and Fairhope, Alabama – all on land held in common with parcels leased to individual homeowners. Altho' no longer recovering only Rent today, all are more prosperous than neighboring towns levying the conventional property tax. Back in the 1950s, some Quaker Georgist residents of Fairhope fled the military draft during the Korean War, resettling in Costa Rica where they began what became that nation's first national park at Monte Verde. Fairhope was one of only four towns on the Gulf Coast recommended for retirement by Consumers Report. (Rybeck, 2000) Recently, this wealthy village pledged a half million dollars to the local private hospital.



When Henry George's followers were numerous enough to threaten to upset the established order, speculators persuaded most American state legislatures to amend their constitutions to require any property tax to fall on buildings and land equally. A rare exception was Pennsylvania, the home state of Henry George. (Coincidentally, William Penn was an early proponent of the geonomic method of public finance, as also was the founder of the Massachusetts colony, William Bradford.) In Pennsylvania, about 20 jurisdictions (cities, counties, and school districts), almost all of them in the poorest region of the country – Appalachia – levy a tax rate on sites higher than on structures. Those towns thereby recovering Ground Rent enjoy 16% more output each year compared to their neighbors. (Tideman, 1998)

Harrisburg, the state capital, was ranked by the US Department of Housing and Urban Developoment at the bottom of US cities, 199 out of 200. Then the city council shifted their property tax. The number of arsons dropped, formerly abandoned areas were developed, and outlying farmlands were spared the bulldozer; quickly the city jumped into the top fifth of American cities. Their mayor Steven Reed credited success to their Property Tax Shift (PTS). (Rybeck, 1991).

While adhering to the PTS, Pittsburgh enjoyed the most affordable housing and by far the lowest crime rate of any major US city (Boyer, 1993). Rand-McNally twice named the Steel City "America's Most Livable". About 15 years ago, Ling Temco Voight, Inc. closed steel mills in Pittsburgh, which was taxing land six times higher than buildings, and in nearby Aliquippa, which still taxes land 16 times higher than buildings. Pittsburgh, which bought the mill, lost this factory. In Aliquippa, former employees bought one mill at a price discounted by the underlying tax and re-opened it, while other investors built a new mill there, keeping the local economy alive. (Sullivan, 2002) Succumbing to pressure applied by speculators, Pittsburgh returned to the conventional property tax in 2001. Already it has seen a drop in construction starts steeper, 38.1%, than in the rest of Pennsylvania, 1.5% (Cord, 2002).

Sharing Rent, Essence Of Geonomics

A government aiming for sustainability would also shift its subsidies from such items as the military, bureaucracy, "white elephant" dams and other grandiose infrastructure, to public goods that directly benefit all citizens, either services or dividends. By paying a share of recovered Rent to residents directly – rather than paying taxes to politicians who're supposed to pay funds to bureaucrats who're supposed to serve citizens – a polity avoids some of the waste and/or corruption inherent in letting government spend public revenue. As the World Bank, Brookings, and many others have found, corruption is an enormous problem that stymies development.

One government already pays residents a dividend from recovered Rents. Alaska pays an oil dividend to every man, woman, and child; in 2002, a family of four received \$6000. To avoid corruption in Iraq, many including the US's Chief Administrator there, advocate an oil dividend for the Iraqi people (Bremer, 2003). To eradicate the lethal corruption in Nigeria, two economists in the IMF, Sala-i-Martin and Subramanian, suggest an oil dividend for the people of that strife-torn African nation (a Reuters story that Forbes picked up, 2003 Aug 1).



Redirecting funds from state to citizen also benefits the environment. It enables consumers to choose the appropriate technologies that would make development sustainable. And it puts self-interest on the side of sustainability; when governments and citizens receive Rent, they have a financial incentive to care about the health of their natural environment, since an area in good health would have higher Rental value.

To avoid contamination, jurisdictions depending on land values should levy four surcharges besides recover Rent: (i) collect an Ecology Security Deposit and (ii) require owners to hold Restoration Insurance, with both charges geared to the value of the land. Two other components in a strategy to "internalize externalities" are to (iii) require would-be polluters to bid on permits to emit potentially hazardous byproducts and to (iv) fine severely and with certainty those who violate health standards. While all four of these protective measures are now used, none are widespread. Once in place, these surcharges would help preclude the waste of Taiwanesque development, but not the wealth of Taiwanesque development.

And bottom-line, for most people, shifting taxes onto locations would save them money. Their land dues (or land taxes or land-use fees or deed fees – whatever mechanism the jurisdiction chooses) would be smaller than all the direct and indirect taxes that they pay now. Yet where people manage to prosper, land grows more valuable; their land dues (or taxes or fees) would rise, too. Receiving a Rent dividend, owners of low value land (formerly the poor) could always afford to pay their land dues. Proposing a dividend to voters may also make geonomics easier to advance with the public.

Support grows

In most major metro regions, the ratio of site value from the commercial center to the rural fringe is 2,000 to one per acre (Gwartney, 1995). Hence the owners of the downtown locations of much greater value, usually the local elite and outside investors, would pay much more than would owners of other locations. Yet for their greater investment, higher payers, too, would receive a much healthier city, while the absence of other taxes enables them to profit from investing in quality construction, new technologies, and workforce retraining. Advancing the productivity of both humans and machines means the economy would get more from less, thereby minimizing its impact on the natural world.

Thru-out the developed world, the environmental movement promotes shifting taxes off goods, onto bads, in general, and shifting subsidies in the opposite direction, from bads to goods (Smith, 2002). These "greens" are also gathering stream behind the PTS. In the US, they have lobbied state legislatures in Vermont, Oregon, and Minnesota. What appeals to them is the fact that landowners, when required to pay Rent via an annual tax, fee, or dues, choose to quit speculating in land and instead put it to good use. Utilizing the central sites of higher locational value spares the outlying sites of lower value; using urban locations more intensely means not using some rural sites at all. Using land optimally is a base for developing sustainably.



Advocates of geonomics offer benefits to major voting blocs. Once they understand how it works, they consent to it, even promote it in some cases. Business likes low taxes everywhere. Greens like recovering Rents for compact cities (e.g., Friends of the Earth). Farmers like recovering Rents for affordable land (e.g., Denmarks' Justice Party, above). Citizens in general like living in a prosperous and stable society.

Implementing Geonomics

In order to recover Ground Rent, assessors must have the cadastre (the land roster) in usable shape: its parcels, their owners, and their values be identified and up to date. Then the jurisdiction could either shift its property tax from buildings to land, or repeal its property tax and levy a land-value tax, or since many jurisdictions already have an LVT albeit at a very low rate, increase the rate to recover their land's Rental value. The jurisdiction could do so gradually, as Philadelphia contemplates, or immediately, as did Mexicali. After shifting the property tax, a jurisdiction could remove other local taxes and apply to the encompassing state or nation for permission to exempt residents from their taxes, while, if need be, raising the rate on land to recover any remaining Site Rent.

Recently around the world, areas in all stages of development have turned to the PTS, even all the way to LVT. In the "Third World", the mayor of Mexicali, Mexico, persuaded the local elite to replace their conventional property tax with a land-value tax (Cohen, 1999). In the former "Second World", Estonia levied a tax on agricultural land, receiving a favorable review in the business press for its results (*The Economist*, 1998). In the "First World", the American State of Virginia granted two towns permission to shift their property tax landward and Philadelphia, Pennsylvania, is now debating their city comptroller's proposal to shift their property tax. The real estate lobby in Philly, a city suffering from block after block of blight, is helping promote the PTS, even paying for full-page ads in local papers (*The City Paper*, 2001 November 22).

Altho' poor undeveloped lands seem of little value, their real estate values may actually be greater than the amount of aid, loans, and investments received altogether (DeSoto, 2000). Even if this estimate is overly optimistic, nevertheless, geonomics swells collectible Rent by collecting it; where government recovers Rent, while removing onerous taxes, there people prosper and bid up land values. Thus there is plenty of Rent for pubic revenue, plus there is plenty of wages and profits for private income. Comparing the collateral damage (reduced investment and employment) from taxes of different rates on sales and income, one sees that if a jurisdiction were to forgo such punitive taxes, it would let people produce more and earn more; output of goods and services would be one quarter greater. (Tideman, 1998) Better-off residents need fewer services from government.



Conclusion: Sharing Rent Works

Wanna-be developers still advocate the quasi-solutions advanced by agrarian reformers and world bankers, despite repeated failures. Even when working, land redistribution and structural adjustment would take from two to four times longer than recovering Rent. To stabilize its economy, polity, and environment, a jurisdiction which taxes land value would successfully reach these three goals in three years, seventeen years, and twenty-two years, respectively. (Smiley, 2000)

Ironically, while geonomics develops a locality independently of trade or aid from the outside, by generating prosperity geonomics simultaneously creates an area that enables trade and that attracts investment, not crippling debt, automatically. Thus by adopting the carrot and stick of zero taxes coupled with land dues, a jurisdiction develops regardless of what the rest of the world does, and inspires the outside world to negotiate mutually beneficial relationships such as consensual trade and investment. Thereafter a geonomic locality could use trade to augment its incipient prosperity (Ades, 2000) delivered by sharing the Rents of land and resources while eliminating taxes on human effort.

Expertise in geonomics resides with NGOs such as the Instituto Henry George in Managua, Nicaragua, that give presentations to specialists and the lay public. Others, such as the Center for the Study of Economics in Philadelphia, help measure how much Rent is available, who'd pay more and who less, and how to go about shifting taxes to recover it. The Lincoln Institute outside Boston, Massachusetts, and other international agencies help modernize cadastres. Wanna-be developers can call upon any of them or the author's Geonomy Society in order to add the recover-Rent option to one's toolkit.

Citations:

1) Ades, Alberto & Glaeser, Edward. *Economic Intuition*, Winter 2000.

2) Andelson, Robert V., ed. *Land-Value Taxation Around the World*, 3rd Edition. New York: Robert Schalkenbach Fdn, 2000.

- 3) Bennett, John. *The Effect of Rating*. Melbourne, Australia: SRD Group, 1996.
- 4) Boyer, Richard; & Savageau, David. *Places Rated Almanac 1993*. Prentice-Hall.

5) Bremer III, L. Paul. "The Road Ahead in Iraq - and How to Navigate It", *The New York Times, 2003 July 13.*

6) Busey, James L. *The Latin American Political Guide*, 20th Edition. Manitou Springs, Colorado: Juniper Editions, 1992.

7) *The City Paper* (of Philadelphia), Real Estate section, 2001 November 22.

8) Cohen, Manuel Perlo. In *Land Lines*, 1999 Sep, Lincoln Institute of Land Policy, Cambridge, MA, USA.

9) Commission for Human Settlements. *UN Habitat Agenda*. (pgh 76h). New York: United Nations, 1996.

- 10) Cord, Steven, ed. *Incentive Taxation*, 2002 May. Philadelphia, PA, USA.
- 11) Desoto, Hernando. *The Mystery of Capital.* Basic Books, 2000.
- 12) Dunkley, Godfrey. *That All May Live*. Roosevelt Park, RSA: A. Whyte, 1990.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

- 13) The Economist, 1998 Feb 28, "Estonia adopts Henry George's tax proposal".
- 14) Fitch, Robert. The Assassination of New York. Verso Books, 1993.
- 15) Gwartney, Ted, Chief Assessor, Bridgeport, CT, USA. Personal correspnd., 1995.
- 16) Harrison, Fred. The Power in the Land. UK: Shepheard-Walwyn, 1983.
- 17) Henley, Albert T. "The Evolution of Forms of Water Users Organizations in
- California". California Law Review, 45, 1957.

18) Lusht, Kenneth M. *Site Value Tax & Residential Development*. Cambridge, MA, USA: Lincoln Institute Monograph Series, 1992.

- 19) Pan American Health Organization. *Quadrennial Report*, 1994-1997. Washington, DC.
- 20) Preparatory Committee for the Monterrey Conference on Financing for Development
- (2002 March). Technical Note No. 3. New York: United Nations, 2002.

21) Rybeck, Walter. "Pennsylvania's Experiments in Property Tax Modernization," *NTAA Forum*, No. 7, Spring 1991, National Tax Association.

22) Rybeck, Walter. "The United States" in *Land-Value Taxation Around the World*. Andelson, Robert V., ed. New York: Robert Schalkenbach, 2000.

- 23) Sala-i-Martin, Xavier, & Subramanian, Arvind. "Addressing the Natural Resource
- Curse: An Illustration from Nigeria", IMF Working Paper No. 03/139; 2003 July 1.
- 24) Silagi, Michael. American Journal of Economics & Sociology. 1994 Oct.

25) Smiley, David, Australia's Macquarie University, "3rd World Intervention", edition,

2000, ISBN0-911312-39-0. NY: Robert Schalkenbach Foundation.

- 26) Smith, Jeffery J. "Greens on George: 133 Notable Environmentalists on Taxing Only Land", 2002, Geonomy Society, Portland, OR, USA, progress.org/geonomy.
- 27) Sullivan, Daniel. Incentive Tax League. Personal correspondence, 2002.
- 28) Tideman, Nicolaus; & Plassmann, Florenz. In *The Losses of Nations*, Harrison, Fred, ed. London: Othila Press, 1998.
- 29) Tideman, Nicolaus; & Plassmann, Florenz. ibid.
- 30) Woodruff, A. M. & Ecker-Racz, L. L. "Property Taxes and Land-Use Patterns in Australia and New Zealand", in *Land and Building Taxes*. Ed. Becker, Arthur P: U Wisconsin, 1969.



AN ANALYSIS OF RURAL DEVELOPMENT-NATURAL RESOURCE INTERACTION IN TURKEY

Ayten EROL, Yusuf SERENGİL

Suleyman Demirel University, Faculty of Forestry, Department of Watershed Management Isparta/TURKEY Istanbul University, Faculty of Forestry, Department of Watershed Management Istanbul/TURKEY aytenerol@orman.sdu.edu.tr

Migration, distorted urbanization, inappropriate land use, social disintegration, natural resource degradation, and rural impoverishment are some major side effects or consequences of rapid industrialization efforts in developing countries. Besides, these issues are not only the results but also the reasons behind many environmental problems that are faced.

Turkey's rural development history is not a brilliant success story. Recently, a Rural Development Strategy (RDS) was put into effect as an integration process to EU by the same government that abolished the General Directorate of Rural Services last year.

In this study we discuss the major obstacles in rural development issue with a case study conducted in Kösederesi watershed, a transition zone basin between eastern Blacksea and eastern Anatolia regions. Many challenging issues arise with the rural development plans from a broad standpoint when the roles of productivity, environment and energy in development are taken into account. We discuss the proposed rural development plans and actions of governments from watershed management point of view with a regional application and evaluate the situation from sustainability point of view. We argue that in case of an unsustainable situation, a bias towards disorder would be inevitable.

Keywords: Rural development, industrialization, natural resources.

INTRODUCTION

One of the fundamental principles of watershed development is to provide welfare and improve living conditions of the residents in a watershed. This is a basic issue in order to ensure the sustainability and health of natural resources. Actually, best results in watershed development projects generally come with the well being of nature together with the inhabitants, while land degradation gets worse with poverty. Poverty is naturally related to migration and education to affect the socio-economical structure and stability of the country. In this paper we investigate the rural living conditions in eastern Anatolia to support our concerns related to the future of natural resources.



POVERTY, MIGRATION, AND EDUCATION CONDITIONS IN COUNTRYSIDE

According to data from TÜİK shows that more than 1/4 th of the population in Turkey lives below the poverty limit. The percentage of people that earn under the starvation wage is more than 1 %. There are one good and one bad news when we look at the picture. The good news is that the poverty in the country is decreasing in average, the bad news is; the decrease is limited with the urban areas. This is the case we need to worry about. The poverty in rural areas has risen to 39,97 % in 2004, while decreased to 16.57 % in cities (Table 1).

| | Percentages of poor individuals (%) | | | | | | | |
|-----------------------------------|-------------------------------------|-------|------------------|-------|-------|-------|-------|--|
| Methods | Turkey | | Urban |] | Rural | | | |
| | 2002 2003 | 2004 | 2002 2003 | 2004 | 2002 | 2003 | 2004 | |
| Food poverty | 1,35 1,29 | 1,29 | 0,92 0,74 | 0,62 | 2,01 | 2,15 | 2,36 | |
| Food and non-food poverty | 26,96 28,12 | 25,60 | 21,95 22,30 | 16,57 | 34,48 | 37,13 | 39,97 | |
| Below \$ 1 per capita per day* | 0,20 0,01 | 0,02 | 0,03 0,01 | 0,01 | 0,46 | 0,01 | 0,02 | |
| Below \$ 2.15 per capita per day* | 3,04 2,39 | 2,49 | 2,37 1,54 | 1,23 | 4,06 | 3,71 | 4,51 | |
| Below \$ 4.3 per capita per day* | 30,30 23,75 | 20,89 | 24,62 18,31 | 13,51 | 38,82 | 32,18 | 32,62 | |
| Relative poverty | 14,74 15,51 | 14,18 | 11,33 11,26 | 8,34 | 19,86 | 22,08 | 23,48 | |

Table 1. Poverty rates in recent years in Turkey [1].

* Here, 618 281 TL 732 480 TL and 780 121 TL, which are the equivalents of 1 \$ purchasing power.

** It's based on the 50% of equivalised median consumption expenditure.

The difference in income between city centers and countryside and among the geographic regions cause migration. We don't have migration statistics for recent years but in the last 30 years migration from villages to cities has come to an equilibrium with migration from cities to villages in the period of 1995-2000. However, migration among the cities has always been around or over 50 % during the period of 1975-2000. The circulation among the villages has decrased steadily during the same period and fell under 5 % in the end of century (Table 2).



Table 2. Migrated population across places of residence, 1975-2000 [1].

| Places of residence | 1975-1980 | 1980-1985 | 1985-1990 | 1995-2000 |
|---------------------------|--------------|--------------|--------------|--------------|
| Total % | 3 584 421 | 3 819 910 | 5 402 690 | 6 692 263 |
| | <i>100</i> | <i>100</i> | <i>100</i> | 100 |
| From city to city % | 1 752 817 | 2 146 110 | 3 359 357 | 3 867 979 |
| | <i>48,90</i> | <i>56,18</i> | <i>62,18</i> | <i>57,80</i> |
| From village to city % | 610 067 | 860 438 | 969 871 | 1 168 285 |
| | <i>17,02</i> | 22,53 | <i>17,95</i> | <i>17,46</i> |
| From city to village % | 692 828 | 490 653 | 680 527 | 1 342 518 |
| | <i>19,33</i> | <i>12,84</i> | <i>12,60</i> | 20,06 |
| From village to village % | 528 709 | 322 709 | 392 935 | 313 481 |
| | 14,75 | 8,45 | 7,27 | <i>4</i> ,68 |

It is easy to infere from the numbers presented in Table 2 that the migration from countryside to cities continues in a steady level around 20 %. On the other hand, regional migration picture is quite different and clearly suggests that eastern Turkey is moving to western side (Table 3).



Table 3. In-migration, out-migration, net migration and rate of net migration by statistical region [1].

| Region (Level 1) | Population place of residence in 2000 | of In- migrat (1) | Out- ion migrat (1) | Net tion migra | F atio n r 9 | Rate of net nigration % |
|-------------------|--|-------------------------|---------------------------|-------------------|-----------------------|----------------------------------|
| Total | 60 752 9 | 95 4 098 | 356 4 098 | 356 | 0 | 0,0 |
| İstanbul | 9 044 8 | 59 920 | 955 513 | 507 407 | 448 | 46,1 |
| Western Marmara | 2 629 9 | 17 240 | 535 172 | 741 67 | 794 | 26,1 |
| Aegean | 8 121 7 | 05 518 | 674 334 | 671 184 | 003 | 22,9 |
| Eastern Marmara | 5 201 1 | 35 432 | 921 351 | 093 81 | 828 | 15,9 |
| Western Anatolia | 5 775 3 | 57 469 | 610 378 | 710 90 | 900 | 15,9 |
| Mediterranean | 7 726 6 | 85 413 | 044 410 | 316 2 | 728 | 0,4 |
| Central Anatolia | 3 770 84 | 45 205 | 108 300 | 113 - 95 | 005 | -24,9 |
| Western Black Sea | 4 496 7 | 66 219 | 008 450 | 799 - 231 | 791 | -50,3 |
| Eastern Black Sea | 2 866 2 | 36 151 | 193 227 | 013 - 75 | 820 | -26,1 |
| Anatolia | 2 202 9 | 57 144 | 315 256 | 922 - 112 | 607 | -49,8 |
| Centraleastern | | | | | | , |
| Anatolia | 3 228 7 | 93 170 | 568 280 | 156 - 109 | 588 | -33,4 |
| Southeastern | | | | | | |
| Anatolia | 5 687 74 | 40 212 | 425 422 | 315 - 209 | 890 | -36,2 |

(1) Migration across the provinces within the region is not covered.

KÖSEDERESİ CASE STUDY

Eastern Blacksea Region

Eastern Blacksea Region is one of the regions with the lowest average income level. The most recent data has shown that the average income of region is just about 2/3 of the general average income of Turkey. There is a great rate of migration from the region because of low income and insufficient employment. Besides, there is a significant level of income inequality in the region. Regional development and settlement structure have taken a shape as a result of socio-economic factors and natural conditions. The region is far from the developed districts of the country, and tough topographic conditions dominate all around. In addition to that, rural settlements are dispersed, and very small with respect to country average.



In the Eastern Black Sea Reginal Development Plan(DOKAP), The Black sea development targets has been explained in detail in a way to mitigate social, economical and environmental problems. Within this framework, it was accepted as a fact that implementation of watershed management as a mean of social participation should be materialized with "detailed soil and water resources program", "integrated dams projects" and "soil conservation" [2].

Kösederesi Watershed

Kösederesi watershed is in a transition zone basin between eastern Blacksea and eastern Anatolia regions, located in the border of Kösederesi district of Gümüşhane province. In most hydrology books, Kösederesi watershed 8847 ha in size, is classified as a large watershed. In Kösederesi watershed area, there is an on-going dam construction which aims to provide agricultural irrigation.



Figure 1. Geographical location of Kösederesi watershed

Climate

The watershed area has a transition climate because of taking place between Eastern Blacksea and Eastern Anatolian. Climate of the watershed is terrestrial characterized with little precipitation in Summer (41.6 mm) and relatively more in autumn (86.2 mm). Long term annual precipitation is 256.2 mm. The climate of the region is defined as semiarid, and microthermal with a substantial amount of water deficit in soil.

Topography, geology and soils

Average elevation of Kösederesi watershed is 1984 m, soil group is dark forest containing a relatively thin organic surface horizon [4]. Long term surveys revealed that litter layer under the deciduous stands disppappeared or became thinner because of grazing or erosion of surface soil. In the area, soil is generally appropriate just for forest or rangeland usage. Dominant geological formation is granit parent material. In cultivated areas parent material is generally very close to the surface and rangelands are degraded as a result of heavy grazing.



Dominant vegetation of Kösederesi watershed is a disturbed structure of *Pinus sylvestris* L. and there is also dense step vegetation which has not completed a natural progress because of disturbance [5].

Socio-economic structure

In Kösederesi watershed, there is only one settlement area, a village, however, it is far from the Köse district about 12 km, but this area is not similar to Köse district regarding to social, natural and economic conditions and its population is 264. The people live on dry farming and stockbreeding activities. In higher altitudes of the watershed there are four plateaus except [6]. In the watershed there are relatively productive forests located near this settlement area. For this reason, the locals benefit from forest products in addition to agriculture and livestock breeding.

RESULTS AND DISCUSSION

The problems that are faced in Kösederesi watershed are parallel with the problems of most other regions in eastern Anatolia. There is an obvious human pressure on the natural resources that stems from poverty. The main issues caused by the low income level of the residents include overgrazing, forest degradation for fuelwood, and agriculture on the steep slopes. The indicators of erosion are everywhere. Surprisingly, this watershed is planned to supply water to a dam.

The watershed, according to our surveys and investigations has nothing to do with regional development plans relevant to natural resources studies. The problems of Kösederesi watershed are similar with both in the region and the country problems because of excessive and misuse usage of the vegetation. The erosion problem has reached to a serious dimension whereas the watershed is planned to supply water to a dam, in construction.

Kösederesi watershed is a typical basin in Blacksea region with little climatic differences as characteristic. Due to rough landscape, there is very limited opportunity for farming. Four to six class lands dominate in the basin. When the watershed are evaluated generally, it is resemblance with the region.

Kösederesi watershed actually has homogenious geographical, economical and social properties. That's why every hectare of the basin require a substantial amount of effort. Most efforts in this points should be directed towards improving the landscape for water production major objective. Public participation is of course a significant portion of an improvement plan and should go with economical improvement studies. The basic principles of watershed management approach should also be emphasized and included in the regional development plans.



The rural development efforts in Turkey for the last 30 years were not effective enough to keep people in place. A natural consequence of this situation was a severe migration phenomenon came with decreasing number of people in agricultural production (from 8.2 million in 1988 to 6.8 million in 2006), decreasing employment (from 1. million in 2000 to 2.2 million in 2006), and decreasing number of livestock (from 12.7 million cattles in 1986 to 10.5 million in 2005; from 43.8 million sheep to 25.3 million sheeps) [1]. All statistics from rural Anatolia shows that the situation in eastern side of Turkey has become worse for the last decades. Furthermore, this situation affects not only the people of the country but also the natural resources. The problems that are faced in many parts of Anatolia are very similar with the ones observed in Kösederesi watershed. The only way to conserve the natural resources in these regions seems to be very related to the economical development of the residences. Otherwise the solutios would not last long.

REFERENCES

[1] TÜİK, http://www.tuik.gov.tr

[2] Türkiye Cumhuriyeti Başbakanlık Devlet Planlama Teşkilatı Müsteşarlığı, Japonya Uluslar Arası İşbirliği Ajansı (JICA), Dogu Karadeniz Bölgesel Gelişme Planı (DOKAP) Nihai Raporu, http://ekutup.dpt.gov.tr/bolgesel/DOKAP/ozet.pdf.

[3] Viessman, W.J., Lewis, G.L., 2003. Introduction to Hydrology. Pearson Education Inc. NJ.

[4] T.C. Başbakanlık Köy Hizmetleri Genel Müdürlüğü, 1996, Gümüşhane İli Arazi Varlığı, T.C. Başbakanlık Köy Hizmetleri Genel Müdürlüğü Yayınları No:1, Ankara.

[5] Terzioğlu, S., 1998, Gümüşhane İli Köse İlçesi Sınırları İçerisinde Kalan Köse Barajı Tahsis Sahası İçindeki Alanın Florası, K.T.Ü Orman Fakültesi Orman Mühendisliği Bölümü, Orman Botaniği Anabilim Dalı, Baraj Sahası İçindeki Florya İlişkin Rapor, Trabzon

[6] DSI 22. Bölge Müdürlüğü, 1998, Köse Baraji ve Sulama Projesi Hazırlık Raporu.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



ECO-FRIENDLY AGRI-PRODUCTION FOR GLOBAL SURVIVAL AND SUSTAINABILITY

P. S. SHEHRAWAT

Department of Agricultural Extension CCS Haryana Agricultural University, Hisar-125004, India psshehrawat@hau.ernet.in

More that 800 million people do not get enough food. The number is likely to increase in next 50 years as global population grows by three billion. They will all need clean water, other life sustaining essentials. As the pressure on natural resources grows to meet both local & international demand, the environment suffers-forests are cleared, water supplies diverted, rare plants are over-harvested^{*}. The world's natural ecosystems are under increasing pressure to supply an expending world population with a sustainable supply of food, fibre, fuel, and other commodities while still providing biodiversity and clean water and air. Our environment is at risk from an age of exponential growth. Populations and the demand of our economies and lifestyles are eroding the Earth's natural capital and environmental services-possibly at an *unsustainable* rate. Some outcomes are too familiar: waste, pollution, degraded land, destruction of habitats, extinction of species, climate change, and poverty.

Research in ecosystem processes earth observation and early warning is applied to natural resource disciplines such as tropical agriculture, fisheries, forestry, wildlife, biodiversity and conservation. Warning of natural disasters includes - drought, desertification, flood, volcanic eruption, and soil salinisation. Environmental degradation can be linked to weaknesses in social market mechanisms, policy failure, week institutions and regulatory frameworks, a lack of public awareness and participation, underdeveloped technical capabilities, and rapid population growth. No doubt, environmental degradation is one of the first indicators of *unsustainable* social and economic system.

Over the past several decades, farmers and researchers around the world have developed ecology-based production system called an array of names. Organic farming, natural, low-input, Integrated, alternative, regenerative, holistic, biodynamic, bio intensive, and biological farming systems all seek *sustainability*.

• Program Directions: 2000-2005 Environmental and Natural Resource Management cited at http:// www.idrc.ca

Ecology-based farming minis nature to create an agro-ecology, where biodiversity is high, plant nutrients are recycled, soil is protected from erosion, water is conserved and not polluted, and tillage is minimised. But in developing countries like *India*, modern high-input intensive agriculture has produced great increases in crop yields. But the social and environmental costs have been high. Loss of topsoil, water pollution, loss of biodiversity, dependence on non renewable resources, rising production costs and falling prices of crops, the decline of rural communities, and fewer and fewer farmers are some of *unsustainable* results of industrialised farming.



These losses force to us to thinking and looking beyond the normal production pattern and with the advent of WTO and India being a member, the country will be required to promote much more diversified sustainable Eco-based farming system of agricultural production.

Increase in cropping intensity with inefficient and indiscriminate use of agrochemical has resulted in accentuating the area under problematic soils and in disturbing hydrological balance. Natural resource base is continually under a state of stress and degradation due to efforts for boosting agricultural production. Further to increase food and non-food output with mounting pressure of population, we are intending towards unprincipled use of scarce and precious natural resources, which are indispensable for our socio-economic development and environmental soundness. This has created a threat to *sustainability*. To find solution of these losses, scientists all over the world are looking for Eco-based farming as a best alternative.

Sound environmental and natural resources management is necessary to sustainable development. If available natural resources are subject to over consumption and the environment is severely degraded, sustained social and economic growth cannot be achieved. There is growing awareness that environmental protection and natural resources management are essential to long-term development. Management of natural resources is the frontline of the struggle for more sustainable and equitable development.

Agri-trends world-wide point toward a need for new thinking in order to meet the needs of an expending population from an increasing constrained agricultural base. Land conversion has slowed as available arable lands have been put in production or converted to higher valued non-agricultural purposes. Gains in production have occurred largely as a result of the introduction of modern energy intensive technologies- mechanisation, new crops varieties irrigation systems, fertilisers, and pesticides.

Unfortunately, these practices have taken a toll on soil fertility and integrity of agroecosystems. An estimate holds that two-thirds of agricultural land has been degraded in last fifty years as a result of erosion, salinisation, nutrient depletion and pollution*. Confronted by these challenges, it is necessary to promote dialogue on developing more adaptive and sustainable agriculture that can represent a positive response to the limits and problems of both traditional and modern agriculture. This results in integrated nature-based agroecosystems designed to be self reliant, resource conversing and productive over both the short and long terms.

In Eco-based farming production and protection of crops mainly developed on indigenous wisdom combat with latest scientific techniques such as bio culture and microbial fertilisers. Eco-farming avoids largely excludes the use of synthetically fertilisers, pesticides, growth regulators and livestock feed additives. To the maximum feasible, eco-farming system rely upon crop-rotation, crop diversification, crop residues, animal manure, legumes, green manure, off farm wastes, and aspects of biological pest control to maintain the soil fertility, soil productivity and the supply plant nutrients.


The pollution in general and poisoning of food with harmful chemicals, and their effect on human health and environment is making people to look for quality nutritive food. Consumers in developed countries and in some developing countries also have become more health conscious and they have started spending on greener, healthy and natural foodstuffs organically produced and labelled products. More over Eco-farming is an environment friendly production system that promotes and enhances biodiversity, biological cycles and biological activities based on minimal use of off farm inputs and management practices that restore maintain and enhance ecological balance. Hence, the expectation that Eco-farming by reverting the use of manure, green manure carbon wastes can bring sustainability to agriculture with eco-friendliness. It is imperative for researchers to develop alternative viable strategies to supplant the chemical farming.

*World Resource Institute. World Resources 2000-2001: people and Ecosystem-the Fraying Web of Life. UNDP/UNEP/world Bank/WIR, 2000. Guide, p.10.

In India, traditionally, Eco-farming has been practised since ancient time but in nonsystematic & non-scientific way and government has not given more emphasis to till date. No incentives for promotion, any reward and encouragement for innovative farmers. Bio fertilizers and bio pesticides not popular in India because of low demand, erratic supply and farmers are ignorant. Majority of farmers are not known about the environmental degradation and its future consequences. National and International organisation should come forward in developing countries like *India* to promote the Eco-friendly farming system for sustainable environmental soundness.

It is the right time to shift for Eco-farming that enhances the environment balancing, sustainability, diversification, and creates more employment opportunities in rural sector. Also there is people's demand for quality nutritive added, residue free and diseases free agro-products throughout the world.

On the other hand, many farmers, researchers and policymakers believe and fear that turning of Eco-farming would mean lower the yield and lower the profit, consumer on the other and, would not want to pay higher price for agro-products, not feasible option to improve food security. It will be difficult to differentiate between the effect of different factors on a eco-farming system, as results are not feasible quickly in eco-management, many of changes may be observable only in long-term, such changes as in yield or soil. Therefore, It is challenge for researchers and extension functionaries to change the attitude of farmers towards eco-farming, while the yield of agro-products are low and prices are high. It is need to create awareness among consumers about the dietary benefit of quality nutritive agro-products.

Also there are many constraints in eco-farming in developing countries, specially, in India pertaining to technologies, information, communication, methods, marketing, consumption, policies and, programs. There are only small research programs and institutional support for eco-based agriculture, insufficient scientific dialogue, and lack of communication between scientists and eco-practitioners in India to till date. Therefore, motivational extension programmes need to be organised to popularise the Eco- farming. Improved information management system may help as a key to the future of sustainable eco-friendly agriculture.



Hence, the challenge is to develop the system, which will facilitate acceptance of eco-farming by farmers and the consumers. Therefore, There is strong need that scientist and policy-makers peruse to help farmers find solutions that fit in their specific circumstances and balance the environmental soundness.

The complexity of environment and natural resource management demands research to help achieve--ensuring secure sources of food by focussing on institutional development, production technology, local resource management and approach policy choices improving human health and well being by managing ecosystems better, protecting local management and of biodiversity. It is essential to create a form where participation can share information about key issues, to work in partnership with professional decision makers and to communicate through educators, to promote attractive landscapes, assuring a safe, nutritious local food supply, maintaining strong rural community. Keeping in view the above facts and developmental changes in our biggest natural resource 'The Environment', there is need to excel research and providing knowledge, policies, tools, scientific, technical analysis for government, environmental protectors, and clients about technology development to reduce air, water and soil pollution, proper management of solids wastes, balance of technical assistance and compliance assurance activities, strengthening environmental management institutions to restore our natural resource.

1. Emerging challenges to agriculture:

1.1 Soil related problems:

Natural resources degradation phenomenon has reached an alarming stage due to intensive agriculture. The deficiency of micronutrients in the soil is making nutritionally weak food chain, which may resulting many physiological disorders in human and animal population in future due to depletion of plant nutrients, soil fertility status is decreasing fast all over the world, which will result in declini8ng the crop productivity.

Decreasing water availability: water is becoming a scare commodity. Agriculture share of water is declining at a faster rate than previous years due to increasing completion for good quality water from urban and industrial sector. Indiscrimation use of canal irrigation water and lack of natural drainage has led to water table rise resulting in water logging and secondary soil salinisation problems. These problems are being further aggravated due to over-expotation of natural resources. The rainwater harvesting is not in practice leading to very low level of recharge. Thus, in future water shortages are likely to become acute.

1.2 Effect of sewage water and industrial effluents:

Soil contamination by sewage and industrial effluents has affected adversely both soil health and crop productivity. The accumulation of toxic substances of industrial and urban origin is increasing and contributed to land degradation. This not only causes reduction in yield of the crops, but also makes nutritionally week food affecting the animal and human health.



1.3 Menace due to Use of Insecticides:

With the intensive agriculture, the problem of insects' pests and diseases are also taking complex shape. The various viral diseases in fruits and vegetables are poisoning serious challenges to the sustainability of agriculture. Farmers have started indiscrimate use of agrochemicals to control diseases and pests. The immediate effect has appeared on environment or ecosystem. Large scale dying of birds is reported every year.

1.4 Profitability problems:

the cost of produce and its quality are the major components, which affects the competitiveness in the market. Indiscriminate use of agrochemicals led to resistance in insects' pests and weeds. Farmers have to spend huge money to manage insecticides. The cost of quality seeds, fertilizers and machine has gone up. The availability of poor quality of inputs in market not only adds to the cost but also create resistance species in the target.

2. Sustainability can be achieved by diversifying enterprises, reliable market, emphasising direct marketing and premium speciality markets, adding value through on-farming processing, reducing the use of synthetic fertilisers by increasing on-farm nutrients cycling, minimising tillage, using soil and water conservation practices, preventing pest problems biologically, and maximising biodiversity on the farm.

The development of Sustainable agriculture requires a basic research in ecology of agricultural systems, more interdisciplinary, breeding of new kinds of crops and crop varieties and greater farmer involvement in designing and carrying out research projects. A sufficient number of economically viable crops to employ in crop rotation are essential for a sustainable agriculture. New crops could be introduced not only for food uses, like new grains and edible oils, paper and energy crops.

The lack of training and stubborn attitude of farmers towards change in their farming system and problems they foresee in bringing about such a change may be responsible for these imbalances.

These losses force to us to thinking and looking beyond the normal production pattern to the diversification. Further with the advent of WTO and India being a member, the country will be required to promote much more diversified agriculture.

Diversification in agriculture is generally seen at increasing the variety of farm products with a view to bring about a shift from the prevailing production pattern, which provide stability in farm income and minimise the risk factor. Commercially, the decision of the farmers to grow a particular crop or go for a particular farm enterprise depends upon the level of prices, yields and the facilities for market clearance.

Diversification can hedge against drought and economic pressures from increased inputs costs, commodity price declines, and regulations that affect the supply of certain commodities. Diversified farm strategies may also include premium-prices products.



A diversified strategy also seeks to access local, regional, national, and international market. The crop diversification has been largely considered as a ray of hope for economic upliftment of the farmers as safeguard against fall in price for a particular farm product. The diversification in agriculture is also practised with a view to avoid risk and uncertainty due to climatic and biological vagaries. Diversification in agriculture can be achieved by diversifying cultivation practices like cover cropping, buffers, high organic matter inputs, intercropping, minimum tillage, rotations, strip cropping etc.

Sustainable diversified agriculture needs new technologies that enhance farmers' abilities to work on a small scale with a variety of crops and livestock operations. Improved information management system may help as a key to the future of sustainable agriculture. Hence, There is strong need that scientist and policy-makers peruse to help farmers find solutions that fit in their specific circumstances and balance the environmental soundness.

The country like India, where cereals mostly dominate cropping systems and 90 per cent of the food requirements have to come from land based farming. Mushroom, horticultural crops, vegetables, dairy, poultry offer a great diversity in diet. More over the diverse agro-climatic conditions prevailing in India also favours the crop diversification. No country grows such a wide range of fruits, vegetables, and flowers as India and yet it has no records worth mentioning in horticultural exports.

In future, with improved living standards, changing food habits, increase in purchasing power, more and more people will look for quality and nutritional agro-products and economic globalisation have put forth challenge for improving production of crops products to meet the domestic and exports needs all over the world. A good beginning has already been made in this direction and in the years to come horticultural crops, poultry products and dairy products will play a meaningful role in fighting hunger and malnutrition. However, diversification has become increasingly important because of intense international competition and changing consumer pattern. So it is timely need for sustainable diversified farming shifting from paddy-wheat to horticultural crops, poultry, dairy, piggery, bee-keeping, specie crops, oilseeds, medicinal, aromatic, fish culture, paper, energy crops, agro forestry, and/or dairy farming etc.

Diversification in agricultural practices has become of almost important to manage the soil and water resources. Soil health improvement programs should vigorously be taken-up. Adoption of suitable crop rotation, use of organic manuring, vermin compost. FYM are basic requirements to improve the soil health. Use of biofertlisers have proved to be beneficial to crop production and maintaining the soil fertility. The use of biofertilisers can be useful to plants and in maintaining the soil health. It also benefits to microbial activities to the soil.

To counter the issue of water scarcity, the first initiative should be to diversify the cropping system I order to have efficient and lesser use of water in crop production.

Biological control is the use of organism to regulate the pests and pathogens below threshold level. The indiscriminate use of pesticides has resulted into undesirable levels of persistence of pesticides in various products., environment pollution and health hazards. Therefore, there is need to encourage farmers to utilize these technologies.



2.1 Promotion of organic farming as diversifying agriculture for sustainability:

In organic farming production and protection of crops mainly developed on indigenous wisdom combat with latest scientific techniques such as bicultural and microbial fertilizers. Organic farming avoids largely excludes the use of chemical fertilizers, pesticides, growth regulators and livestock feed additives. To the maximum feasible, organic farming system rely upon crop-rotation, crop diversification, crop residues, animal manure, legumes, green manure, off farm organic wastes, and aspects of biological pest control to maintain the soil fertility, soil productivity and the supply plant nutrients and to control insects, weeds and other pests.

More over organic farming is an environment friendly ecological production system that promotes and enhances biodiversity, biological cycles and biological activities based on minimal use of off farm inputs and management practices that restore maintain and enhance ecological balance. After green revolution, this knowledge base has been slowly degraded. Organic farming reduces the cost of cultivation and offers price premium, conservation of soil and water, prevention of soil erosion and biodiversity, generation of rural employment, lowering the urban migration, improved household nutrition, and local food security. Organic farming is also known for revival of inherent capacity of soil via biological life, degraded due to synthetic chemicals, optimising health and productivity of interdependent communities of soil life, plants, animals and people.

In India, traditionally, organic farming has always been practised since ancient time but no more emphasis to till date, no government support and incentives for promotion. No reward and encouragement for innovative organic farmers. However, India is largest producer of a variety of fruits and vegetable in the world due to its diverse agro-climatic conditions. About 70 per cent area of cultivable land is rain-fed in India, where no fertiliser is used and open for organic farming. Approximately 600-700 million tonnes of agricultural wastes also available per year but most of it is not properly used. Biofertilizers and bio pesticides not popular in India because of low demand, erratic supply and farmers are ignorant. Another reason is heavy advantage of chemical pesticides and chemical fertilisers in increasing the crop yields. So National and International organisation should come forward in developing countries like India to promote the organic farming.

It is the time to shift for organic farming that enhances the environment balancing, sustainability, diversification, and creates more employment opportunities in rural sector. Also there is people's demand for quality nutritive added, residue free and diseases free organic agro-products throughout the world. Organic products also promise better prospects for market and trades. There is ever-growing export market for organic products. The domestic market of organic products in India is emerging.

Consumers in developed countries and in some developing countries also have become more health conscious and they have started spending on greener, healthy and natural foodstuffs organically produced and labelled products.



2.2 Promoting Agri-Tourism for health environment and eco-friendly soundness:

Has recently emerged as an opportunity for many farm families to diversify their agricultural operations into economic activity that occurs when people travel with agricultural products, services or experience. Such on farm diversification is income generation, as well as increased awareness and education of the non-farming public about farms and their products. More over 'Agri-tourism' can contribute sustainability in agriculture through sustaining and better management of natural resources in an Eco-friendly system. Agri-tourism is an expanding sector around the world and emerging a growth agricultural industry. The 'Agri-tourism' has been in existence in Europe, USA and Canada for more than 100 years and it is looked as a new area in developing countries like India.

Increasingly tourists want to experience rural life, meet and interact with the local people to get experience about agricultural activities. People are travelling to family farm as a tourist destination for peace and tranquillity, interest in the natural environment, disillusionment with overcrowded resorts and cities, nostalgia for their roots on the farm rural recreation, an inexpensive getaway, and curiosity about the farming industry and lifestyle.

Agri-tourism is based upon services, activities and/or products offered by an agricultural producer to the tourist. For the tourist, there is a net gain in that he obtains a better understanding and knowledge of the agricultural world; for the farmer, he has an opportunity to show an often predominantly urban population an insight into the agricultural way of life and reap some economic benefit in the process. The interaction between the farmer and tourist takes place on the farm or at other venues such as fairs and exhibitions. Facilities, which promote and interpret the agricultural industry to tourists such as heritage gardens, agricultural museums, county fairs, and food processing operations, may also be considered part of the Agri-tourism sector.

Agri-tourism can include farm accommodation, farm vacations, direct sales, horse and carriage rides, picnic and camping sites on farms, on-farm craft and food stores, educational tours, agricultural fairs and farmer field days, farmers' markets, boating &canoeing, petting zoo, roadside stands, flower festival or show, U-picking operation, swimming, and the list goes on.

Agri-tourism businesses and other alternatives enterprises offer farmers the opportunity to earn higher profits by replacing their traditional operations innovative, sustainable on farm. Agricultural tourism takes many forms, including the drive-by, as in those who patronise farm and roadside stands and farm stays, where people come and stay for several days. Agritourism presents opportunities for the farming community to diversify and take advantage of the natural and cultural heritage resources both on the farm and in the environs. This could involve the sale of new food and craft products, tours, fish-out ponds, bird watching and nature appreciation.

Exploiting these opportunities requires a new set of skills, somewhat different than those typical of a more conventional agriculture. It is direct marketing. Some benefits of agritourism are diversification of the farm operation, adding a new enterprise such as farmer's market, attracts customers to farms, provides stability of the agriculture industry, excellent



means of supporting rural communities and businesses, an opportunity to increase agricultural awareness and education among the public, and promote agricultural products. Agri-Tourism provides environmental soundness, diversifying activities in agriculture, additional income generation, more interaction, management of natural resources, and employment in rural sector. Agri-Tourism also contributes to sustainable agriculture because the visitors gain a deeper understanding about agriculture and the farmer derives an additional revenue stream from the farm.

In developing counties like India, such type of new agriculture has better scope and prospects, especially, near to big and metro cities where customers found having high investment capacity for fresh, nutritive added agro-products and agricultural show. Agri-tourism is an intensive investment farm operation requires sound financial position of the farmers, high tech field operations, and nature loveable customers that are lacking. Information management should be sound to provide training included of customer service, local tourism opportunities, hospitality, public relations, first aid, and food preparation, Hence, the Government, planners, and policymakers should take initiative for promotion of Agri-tourism in developing an awareness of agriculture and a vision for the industry, acting as a catalyst, visiting farms, setting standards for agri-tourism, and providing subsidies.

| Commodity | 2001 | | 2002 | |
|--|-----------|---------------|--------|---------------|
| | Samples | Contamination | Sample | Contamination |
| | (No.) | (%) | (No.) | (%) |
| Vegetables | 712 | 61 | 529 | 63.5 |
| (17 crops) | 12% above | | | 8.5% above |
| | | MRL | | MRL |
| At Hisar all Contaminated – 46% above MRL, Heptachlor and Cypermethrin | | | | |
| Fruits | 378 | 53 (less than | 329 | 47 |
| (12 crops) | | MLR) | | (Approaching |
| | | | | MR) |
| Fields in Faridabad – vegetables fruits flowers highly contaminated | | | | |

Table 1 : Pesticide Residue Persistence in Agricultural Produce and Food Commodities.

Fields in Faridabad – vegetables, fruits, flowers highly contaminat Source: Edited by Dr. B. S. Dahiya, CCS HAU, Hisar,

Table 2 : Pesticide Residue Persistence in Total Diet.

| Commodity | 2001 | | 2002 | | |
|--------------------------|---------|---------------|--------|---------------|--|
| | Samples | Contamination | Sample | Contamination | |
| | (No.) | (%) | (No.) | (%) | |
| Vegetables | 235 | 60 | 199 | 53 | |
| Non-Vegetarian | 234 | 78 | 175 | 56 | |
| Total | 469 | | 374 | | |
| | | | | | |
| HCH. DDT. Endosulfan 15% | | | | | |

63.3% contaminate samples @ 11.2% exceeded MRL values

Source: Edited by Dr. B. S. Dahiya, CCS HAU, Hisar, India.



Table 3: Residue Persistence in Animal Feed, Fodder and Irrigation Water.

| Commodity | 2001 | | 2002 | |
|------------------------------------|---------|---------------------------------|--------|---------------|
| | Samples | Contamination | Sample | Contamination |
| | (No.) | (%) | (No.) | (%) |
| Feed and | 125 | 81 | 373 | 45 |
| Fooder | | | | |
| HCH, DDT, Chlorpyriphos Endosulfan | | | | |
| Irrigation Water | | | | |
| General Water | 258 | 60 (HCH, DDT) | | |
| Surface Water | 251 | 73 (Endosulfan & Chlorpyriphos) | | |
| • Canal (Hisar) | 10 | All Contaminate | ed | (4 above MRL) |
| • Pond (-do-) | 11 | -do- | | |

Source: Edited by Dr. B. S. Dahiya, CCS HAU, Hisar, India.

Table 4: Pesticide Residue persistence in Animal Products.

| Commodity | 2001 | | 2002 | |
|---|---------|---------------|--------|---------------|
| | Samples | Contamination | Sample | Contamination |
| | (No.) | (%) | (No.) | (%) |
| Milk | 537 | 52 | - | - |
| 94% HCH, 9% Endosulfan, DDT – residue | | | | |
| Above MRL (14% with DDT 18% HCH, 5% Endosulfan) | | | | |
| Traces of residues in animal feed and fodder | | | | |
| Butter | - | - | 184 | 67.4 |
| (DDT & HCH, Endosulfan at Hisar above MRI | | | | |

Source: Edited by Dr. B. S. Dahiya, CCS HAU, Hisar, India.

Table 5 : World Markets for Organic Food and Beverages 1997.

| Market | Approximate | % of total | Expected Growth Rate over the |
|---------------|----------------|------------|-------------------------------|
| | Retail sales | food sales | Medium terms upto 2005 |
| | (US\$ million) | | |
| Germany | 1800 | 1.2 | 5.10 |
| France | 720 | 0.5 | 20 |
| United Kingdo | 450 | 0.4 | 25-35 |
| Netherlands | 350 | 1 | 10-15 |
| Switzerland | 350 | 2.0 | 20-30 |
| Denmark | 300 | 2.5 | 30-40 |
| Wseden | 110 | 0.6 | 30-40 |
| Italy | 750 | 0.6 | 20 |
| Austria | 225 | 2 | 10.15 |
| Other Europe | 200 | - | - |
| Total Europe | 5255 | - | - |
| United States | 4200 | 1.25 | 20-30 |
| Japan | 1000 | - | - |
| Total | 10455 | - | - |

Source: Agri-business and horticulture, November 2002



| Table 6 | : | Organic | Exports | from | India |
|---------|---|---------|---------|------|-------|
|---------|---|---------|---------|------|-------|

| Product | Exported (t) | Product | Exported (t) |
|---------------------------------|--------------|-----------------|--------------|
| Tea | 3000 | Honey | 173 |
| (Block Tea, green tea) | | | |
| Coffee | 500 | Mango pulp | 952 |
| Rice | 2500 | Pineapple juice | 589 |
| Wheat | 1150 | Banana puree | 325 |
| Pulses | 300 | Dry Banana | 1890 |
| Spices | 700 | Sesame | 739 |
| (manily pepper and giner) | | | |
| Fruits | 1800 | Spices | 100 |
| (banana, pineapple, mango etc.) | | | |
| Nut (Cashew walnut) | 375 | Mustard | 2 |
| Cotton | 1200 | Peanut candy | 7 |
| Herbal Products | 250 | Walnut | 227 |

Source: AC Nielsen ORG-MARG Pvt. Ltd. 2002

Table 7 : Exportable Forms of Herbal Products/ Herbal diversity of products

| - | |
|----|---|
| | Cut |
| | Powdered |
| | Froxen |
| | Fixex oil |
| | Carrior oils |
| | Essential oils |
| | Flower waters |
| | Aqueous Extracts |
| | Co ₂ extracts |
| | Liquid extracts |
| | Standardized extracts |
| | Dry extracts |
| | Tablets |
| | Capsules |
| H | erbal diversity of market sectors |
| | Dyes |
| | Food |
| | Beverages |
| | Health care |
| | Animal Feed |
| | Medicines |
| | Industrial Crops |
| | Gift/Miscellaneous |
| | Cosmetic |
| | Functional Food |
| | Homoeopathy |
| Sc | ource: Edited by Dr. B. S. Dahiya, CCS HAU, Hisar, India. |
| | |



Table 8 : India – A Leader in Several Argi- Categories

| Category | India's Ranks |
|------------|--------------------|
| Spices | 1 |
| Milk | 1 |
| Rice | 2 |
| Sugar | 2 |
| Wheat | 2 |
| Vegetables | 2 |
| Fruits | 2 (No. 1 in mango) |

Table 9 : Some Indian Major Agri-Products for Exports

| Sp | oices : | |
|----|-------------------|--------------|
| | Black pepper | Ginger |
| | Celery Seed | Nutmeg |
| | Chilli | Sofron |
| | Clove | Sesame |
| | Coriander Tamai | rind |
| | Cumin Seed | Turmeric |
| | Dill Seed | Vanilla |
| | Fennel Seed | White Pepper |
| | Fenugreek | |
| Μ | edicinal Plants : | |
| | Ashwagandha | |
| | Boswelia | |
| | Garcinia | |
| | Cambogia | |
| | Ginger | |
| | Gotu Cola | |
| | Gymnema | |
| | Henna | |
| | Myrrh | |
| | Neem | |
| | Psyllium Husk | |
| | Rauwolfia | |
| | Serpentina | |
| | Rose | |
| | Senna | |
| | Shatavari | |
| | Terminalia | |
| | Tribulus | |
| | Turmeric | |



Table 9 Cont.

| Es | sential Oils: |
|----|---|
| | Black pepper |
| | Citronella |
| | Ginger |
| | Lemon grass |
| | Sandalwood |
| Ot | her Items: |
| | Durum and bread Wheat |
| | Malt Barley |
| | Coarse cereals |
| | Guar |
| | Rice (Basmati and others) |
| | Vegetables, Fruits |
| | Organic meat and other animal products. |
| | |

REFERENCES:

Agriculture situation in India 2001

Alexander, N., & McKenna, A. (1998). Rural Tourism in England. International Journal of Contemporary Hospitality Management. 10: 203-207.

Bruckmeier-K; Grund-H; Symes-D (ed.); Jansen-AJ (1994). Perspectives for environmentally sound agriculture in East Germany. Agricultural restructuring and rural change in Europe. 180-194; Wageningse Sociologische Studies No. 37: 12.

Collins, J.K., Cuperus, G.W., Cartwright, B., Stark, J.A. & Ebro, LL. (1992). Consumer attitudes on pesticide treatment histories of fresh produce. Journal of Sustainable Agriculture 3: 81-98.

EI Titi, A. 1992. Integrated farming: an ecological farming approach in European Agriculture. Outlook on Agriculture. *21* (1):33-39.

Emerging challenges to Haryana Agricultural Economy via-a-vis Diversification in Agriculture edited by Dr. B. S. Dahiha and dr. R. B. Srivastava, Directorate of Research CCS HAU, Hisar.

Fredrick, M. (1993). Rural tourism and economic development. Economic Development Quarterly. 7: 215-224.

Greene, C.R. (2001). U.S. Organic farming emerges in the 1990s: Adoption of certified systems. USDA-ERS, Agriculture Information Bulletin No. 770.

Joshi, P. K, Gulati, Ashok Birthal, P.S, and Tewari, Laxmi (2002). Agricultural Diversification and Challenges of Market Reforms in south Asia. Paper presented at South Asia Initiative ICRIER-ICAR-IFPRI Conference on Economic Reforms and Food Security-The Role of Trade and Technology, New Delhi, India from April 24-25, 2002.

Kataki, P.K., Hobbis, P. and Adhikary, B. 2000. The rice-wheat cropping system of south Asia trends, constraints and productivity-a prologue. Journal. Crop. Productivity. *3* (2): 1-26.

Kurosaki, Takashi (2003). Specialization and diversification in Agricultural Transformation:



The case of West Punjab. American Journal of Agricultural Economics. 85 (2) : 372-387.

Lapisse-S (1997). Organic agriculture. Courier-de-la-Nature. 1997, No. 164: 32-35.

Leone Ohnoutka, David W. Hughes (2002). Training Needs of Tourism-Based Businesses. Journal of Extension, June 2002. Volume 40 Number 3

Nieberg-H; Schulze-LS . (1996). Profitability of farms converting to organic farming in Germany - empirical results of 107 farms. Farm-Management.1996,9: 5.

Ongley, E.D. 1996. Control of water pollution from agriculture. FAO irrigation and drainage paper # 55, FAO, Rome.

Rashmi , Mayur. (1996). Challenge of Organic agriculture for sustainable development in South. IFOAM' 96. Book of Abstracts. Proceedings of 11th IFOAM Scientific Congress held at Copenhagen, Denmark from11-15 August, 1996.

Sullivan, Preston. 2003. Applying the principles of Sustainable farming. In: ATTRA publication May, 2003. US Department of Agriculture, Fayetteville, California.

Swift, M. J., J Vandermeer, P. S. Ramakrishnan, J.M. Anderson, C.K. Ong, and B.A. Hawkins. (1996). Biodiversity and Agro-ecosystem function. In: Function Roles of Biodiversity: A Global Perspective. John Wiley and Sons Ltd., New York: 261-298.

Zehnder, Geoff; Chip Hope, Hoke Hill, Libby Hoyle, James H. Blake (2003). An Assessment of Consumer Preferences for IPM- and Organically Grown Produce. Journal of Extension April 2003, Volume 41 Number 2



ECONOMICS, ENVIRONMENTAL PROTECTION AND SUSTAINABILITY

Halil SEYIDOĞLU

Department of Economics and Finance Doğuş University, Turkey hseyidoglu@dogus.edu.tr

In a competitive, private sector economy the basic principle for business firms is to maximize profits. Profit maximization on the other hand is closely associated with cost minimization. Minimization of costs is a target not only for firms operating in the domestic market, but also for firms producing for international markets. In a world characterized by rapid economic and financial globalization, competition at international markets has become much more severe.

There is no doubt that the target of cost minimization should have serious implications for environmental protection. Because, taken individually, business firms may reveal a tendency to pollute environment in order to minimize their costs or to maximize their private interests. In economic terms, this means that firms may have a natural tendency to use environment as a free resource in their production processes. For example, they might release their polluting emissions into air, let their harmful discharges flow into lakes, seas or rivers, or dispose their toxic wastes onto land. This might create pollution problems that seriously threaten human, as well as animal and plant life.

The pollution, on the one hand, brought about by industrialization and the desire to have a clean environment on the other is undoubtedly one of the most dangerous conflicts of our age. To have a clean environment is a fundamental need for human societies to lead a decent or a high standard life.

By looking at the evolution of ideas on economic development and industrialization one can conceive how the issue of protection of environment came to the forefront among the current issues. In the early days of industrialization the major concern was to raise the per capita income figures in the society. This is almost a mechanical view on development; because, practically no serious attention was given to the protection of environment and to preserving the stock of nonrenewable resources. This strategy of development could be characterized as "industrialization at any cost."

While government policies were as such, there was also no public consciousness regarding the environmental problems. In fact this could depict the situation in the developing countries during the time before the 1970's. However as the problems of pollution reached to almost intolerable levels, the value of "green" and a clean environment was to be appreciated better. Hence views on industrialization started to change in the 1980's in some of the developing countries and the public opinion in the industrial countries became more environmentalsensitive. Accordingly, environmental issues were on the agenda of some conferences at national and international level. Also systematic efforts were initiated especially in the developed countries to make public more interested in the preservation of the environment.



In the 1990's it is observed that the scope of the issue became more international and topics such as the preparation, adoption and harmonization of international environmental standards were on the agenda at some international forums. Besides, there were some trade conflicts arising from the differences of standards especially between the developed and the developing countries.

Today, in the literature of economic development it is a firmly established fact that, development policies should have respect for the protection of the environment. As a matter of fact, if the ultimate aim of economic development is to raise the quality of human life, there could be no other choice rather than the respect for the environment. As we all know this kind of economic development came to be known as "sustainable development" in the development literature.

However, presently there are big differences among nations in terms of government policies, public consciousness, attitudes and standards on environmental protection. Difference are great especially between developed and the developing nations which in turn gives rise to serious disputes in international trade. Some producers and exporters from industrial countries claim that having more stringent standards on environmental protection in their countries leads to higher costs and puts them at a disadvantageous position in world markets vis-à-vis the products from the developing countries that have less stringent standards. They call this as "unfair" trade situation and argue that measures are to be taken to correct it.

In fact, from their point of view the problem is not only concerned with differences in environmental standards, but also in work conditions like, the employment of child labor, the length of work hours, workers safety regulations, right of retirement pensions, etc. The backward work conditions and intensive use of child labor in the less developed countries, they claim add to the inequality in international competition.

These allegations gave rise to a heated debate in international trade between economists, politicians and environmentalists. Two general approximations were taken in the discussions: One, harmonization of standards among the nations; two no harmonization is necessary; as in the case of free trade, each country should be left to act independently in pursuing their own policies on issues of environment and work conditions. Of course international harmonization of standards might mean either to relax standards in the industrial countries which would mean a race-to the bottom, or alternatively to raise standards in the developing countries to the levels comparable to the industrial countries.

Those that argue for harmonization point out that until any kind of such harmonization is attained, industrial countries should impose restrictions on goods imported from the developing countries that are produced by techniques damaging environment or by using child labor. This gave serious conflicts between the developed and the developing countries. One such conflict for example occurred between the USA and Mexico, which we shall review, below. Before that, let us take a look at the environmental policies of the international trade organizations like GATT and WTO.



As would be recalled, GATT was established in 1947 for the purpose of liberalizing world trade. Through multilateral trade negotiations it made substantial efforts to reduce tariffs especially on industrial goods. At 1994 Uruguay negotiations of GATT, World Trade Organization (WTO) was founded and it replaced GATT, and the mandate of liberalizing trade was conferred to WTO after the target of liberalization was broadened to incorporate trade on agricultural goods and services. Shortly, today WTO is the main institution to make attempts towards that end.

It should be reiterated that the underlining principle for GATT, as well as for the WTO is free trade. They make no reservation for imposing restrictions on imports of goods that were produced in foreign countries by methods that create pollution. In other words one can not discriminate against imports by simply looking at how those commodities are produced. This violates the traditional free trade principle of GATT and WTO.

That is the major reason why environmentalists or non-governmental organizations like "the Greenpeace" are against the WTO today. They are against not only WTO, but also against the present globalization movement in general, since globalization might mean free trade, which in turn might worsen pollution problems. This explains why Ministerial Meeting of WTO in Seattle in 2001 invoked serious protests and demonstrations by these groups and why it broke down without generating an agenda.

The Tuna-Dolphin Dispute: In 1990, some major US canneries announced that they would only sell tuna that was caught with dolphin safe methods. Labeling their products as dolphin safe was in fact a way to differentiate the product by the type of process.

In 1991, the US imposed trade restrictions on Mexico and several other countries because of their excessive dolphin kill by tuna fisherman. Upon that, Mexico and its allies appealed to a GATT dispute settlement panel, claiming unfair trade restrictions. In the end the GATT panel upheld Mexico's challenge, saying that the United States' embargo violated the GATT's nondiscriminating policy among member nations. The GATT panel also found that the embargo was not "necessary" as the US had claimed to protect "human, animal or plant life or health." Accordingly, the panel also decided that there were other options the US had overlooked in solving the tuna-dolphin problem. Then in 1992, ten countries (including the US and Mexico) adopted the La Jolla agreement, which specified an international limit on dolphin mortality rates among tuna fishers. Hence, it turned out that dolphin deaths declined impressively. This positive result was made possible through international negotiations. This is a way of handling international trade disputes arising from differences in environmental standards.

On the opposite side, there is another group who argue that there is little reason to insist on global environmental standards, because it diminishes the benefits from trade. In mainstream economics, Theory of Factor Endowment is used to explain the causes of international trade. According to the theory as long as domestic prices differ among nations, there is a potential for a mutually beneficial trade. It makes no difference whether these price differences arise from factor endowments, technologies, tastes or even environmental standards among the nations. In other words, there would be gains to be held from trade whatever forces behind the international price differences are. This argument was mainly upheld by free-traders,



especially by Paul Krugman. But we think that this narrow interpretation of the theory does not provide a reliable solution to the international pollution problems. In order to adopt the theory to the problems of environmental pollution it has to be interpreted broadly, i.e., it has to be modified to cover the negative effects of pollution.

Pollution problems created by free trade or by any other reason in a country affects negatively not only the welfare of the people in that country, but also life standard in other countries as well. In other words, pollution problems are dispersed internationally, rather than being confined to a country where they are originated. Take the case of a river, for example that crosses through borders of several neighboring countries. Could it be said that, countries down the river basin are immune to the pollution made by the upstream countries? Or how could it be claimed that a polluted sea does not affect the countries that share the shores together? The same thing is true for the depletion of the ozone layers in one part of the world. Hence from the viewpoint of international pollution, countries are tied to one another and a narrow interpretation of economic effects does not seem to be an appropriate solution.

This brings us to the proposals on the harmonization of the environmental standards. Obviously it is unrealistic to adopt the laxity of environmental standards. A clean environment is already an indispensable condition of high living standards in the rich industrial countries. Also it is a fact that as countries get richer, the demand for a cleaner environment rises. Yet, imposing stringent standards of the industrial countries to the developing countries does not seem to be realistic solution as well. Because, first of all these countries, especially the least developed ones, do not have economic and social potentials required to implement such high standards. Strict standards on environment and work conditions, including the employment of child labor, might simply lead production, employment, exports, imports and rates of economic development in these countries to fall, and hence their poverty to deepen. Besides, in most cases, since their industrial structures are relatively backward, the developing countries may not be held responsible for the major part of the pollution problems. Of course, it does not imply that such standards are unnecessary, but rather it means that the success of their implementation largely depends on the stage of development of the country in question.

While the chances in the short run seem to be very weak, in the long run it would not unrealistic to expect that the developing countries would be more interested in the environmental issues, because of the enhancement in their living standards. Therefore we might suggest that, beside the goal of industrialization there have to be some long-run environmental targets to be attained. Of course this would impose a tremendous financial burden on these countries. Hence, the developing countries would be in need of financial support from the governments of the industrial countries, as well as international economic and financial organizations, in order to set up an infrastructure conducive to the attainment of the long-run environmental targets. This will contribute not only to the economic and social welfare of those countries, but also to the level of welfare of the world as a whole. But, it should be reminded that the transfer of funds to the developing countries should not reduce the present flow of resources to these countries, but should only substantiate it. In the meantime, there should be no laxity of standards in the developed countries. And also, in the big industrial countries non polluting technologies need to be encouraged by all means.



It should also not to be ignored that the differences in the standards might cause to the migration of the polluting industries from industrial to the poorer nations. This kind of transfer of industrial sites should not be encouraged, because from a global point of view this does not help the solution of the problem, but could make it worse.

Turkey is a country that suffers severely from international pollution. The Danube River that crosses all the way the Middle and Eastern Europe, has unfortunately become a source of pollution of the Black Sea, since it collects and dumps all the industrial discharges into it. It is quite unfortunate that the number of fisheries in the Black Sea is decreasing every day and no life exists at the bottom of it. Moreover, frequently barrels including toxic materials are reported to be dumped into the coastal waters of the country. Since I myself worked on the island for some years in the past, I know that the Republic of Northern Cyprus unfortunately faces the same dilemma. Very often some unidentified boats are reported to dump their waste into the waters of this beautiful country, whereas a clean sea and sand are vital for the tourism and economic wellbeing of this charming country. These are only a few of the examples to indicate that international monitoring and cooperation is indispensable for the prevention of pollution.

Conclusively, a few words about the role of World Trade Organization on trade-related pollution problems might be appropriate. As we mentioned before, GATT and WTO would give no permission for introducing restrictions depending on how goods are produced in foreign countries. It is rationalized on the grounds that the free trade is the underlining principle adopted traditionally by these institutions. Although problems of environmental pollution are accepted to fall within the authorities of national governments as well as some domestic and international specialization agencies, it does not seen appropriate that the WTO organization should have no obligation in that respect. It is already endowed with the powers to participate effectively in the solution of the trade disputes among the nations. As was explained before, when the fact that an ever-increasing number of trade conflicts arise from the environmental issues is taken into consideration, it would be more realistic for WTO to take on an effective role in that regard. The WTO, for example could pioneer, participate in and coordinate the efforts to lessen the damaging effects of free trade on the environment. The solution of the problem requires finding a trade-off between steady increase in the world trade and a minimal damage to the environment.

The issue is already on the agenda of the Doha Ministerial Meeting of WTO, and we hope that positive steps could be taken in that regard by procuring a consensus among the developed and the developing countries of the world.





AN ASSESSMENT OF THE COMMERCIAL VIABILITY AND SUSTAINABLE DEVELOPMENT OF SELECTED NON-ALCOHOLIC INDIGENOUS BEVERAGES IN SOUTH AFRICA.

Isaac RAMPEDI

UNISA Environmental Sciences Department, SOUTH AFRICA rampeit@unisa.ac.za

This study has examined the commercial potential of selected non-alcoholic beverages, namely, rooibos, honeybush and mountain tea using the method of triangulation. Their various economic markets and financial aspects are identified to demonstrate the commercial feasibility of the indigenous 'bush tea' industry in South Africa, which is expected to grow in view of rising national and international health consciousness. In terms of product development rooibos tea is the leading South African indigenous tea and the brand is well established in international markets, in addition to commercial successes in the domestic markets. According to the life cycle model, the tea is in the growth phase of market penetration and is followed by honeybush tea which is rapidly making inroads in the 'bush tea' industry, albeit, in a relatively shorter space of time. Sales of honeybush tea, however, demonstrate that it is still in the introduction phase. On the other hand, mountain tea is popular amongst those who consume it although it is not yet developed commercially. Throughout the study issues related to economic and environmental sustainability of these products have been identified in keeping with the precautionary principle and the goals of sustainable development.

Introduction

Indigenous plants have been used for millennia for food, clothing, shelter, and utensils, especially in many rural areas throughout the world.¹ However, the onset of social, economic, and technological changes arising from accelerated urbanization and industrialization in many parts of the world have altered this pattern. This pattern also exists in the southern African region because of rapid changes accentuated by the transition from subsistence farming to modern agriculture and urbanization, growing awareness of health care and education, and the development of commercial industries.² However, during the last few decades South Africa has witnessed a renewed research interest based on the sustainable use of indigenous plants.³ About 18 000 vascular plant species occur within the various provinces of South Africa, of which 80 per cent occur nowhere else.⁴ Most research in the use of indigenous plants has concentrated on the isolation and biological effects of chemical compounds extracted from medicinal plants to treat human and animal diseases.⁵ To this end a number of new phytopharmaceuticals (pharmaceuticals made from indigenous plant extracts standardised to active compounds) are being developed based on findings emanating from this research.⁶ Other researchers ⁷ have investigated the economic and environmental sustainability of the indigenous medicinal plant trade in the various parts of the country. Research on essential oils - distilled from indigenous plants in mostly rural environments - is also receiving attention. Essential oils are key raw materials in the competitive multi-billion rand flavour and fragrance industry.⁸



Another research focus on South Africa's indigenous plants is in the field of floriculture, which examines the commercial agriculture and the sustainable use of the fynbos and bulbous plants.⁹ Inevitably, other uses of South African indigenous plants such as their economic potential as non-alcoholic and alcoholic beverages have received less attention. However, South Africa has a rich tradition involving the use of indigenous plants for the production of beverages ¹⁰. The beverages are produced in mostly rural communities for home consumption and trade. Table 1 indicates some of the beverages produced from known indigenous plants in South Africa.¹¹

| Nature of the beverage | Name of the beverage | Indigenous plant specie |
|------------------------|----------------------|-------------------------|
| Non-alcoholic | Rooibos tea | Aspalathus linearis |
| Non-alcoholic | Honeybush tea | Cyclopia intermedia |
| Alcoholic | Marula beer & cream | Sclerocarya birrea |
| Alcoholic | Cream | Hyphaene coriacea |
| Alcoholic | Beer | Sorghum bicolour |

Table 1: Different types of beverages produced from South Africa's indigenous plants.

Nevertheless, long term over-harvesting from the wild by rural communities to produce some of these beverages, coupled with the activities of unregulated traders may give rise to unsustainable forms of utilisation which may impact the commercial viability of the indigenous beverage industry adversely. ¹² For instance, the traditional use of the ilala palm by the rural communities inhabiting the Maputaland area in the Ingwavuma Magisterial District in the Kwa-Zulu-Natal province is environmentally and economically injudicious. ¹³ The ilala palm (see figure 1) is highly prized by the local people in that area and they have used it for many generations to make palm wine and to generate income for the rural economy. ¹⁴ However, in making the wine the apical meristem and leaf bases of the plant s are cut to initiate the flow and the collection of the beverage making cell sap.





Figure 1: A species of *Hyphaenia coriacea* from which the sap for making wine is collected. (Source: <u>http://www.plantpalm.com/vpe/photos/vpe_photos.htm – Accessed Feb 2006</u>)

Studies conducted on the socio-economic status and development potential of the Maputaland area warn that if this method of exploitation continues unabated and traditional harvesters lack the know-how of restoring damaged palm trees, this may lead to the extinction of the sought after indigenous specie and increased environmental degradation of habitats where it naturally grows. ¹⁵ Fortunately, other indigenous beverages in South Africa are currently propagated and produced in large quantities to meet the needs of the commercial agricultural sector, rural communities and the natural environment .¹⁶ In many ways this is in line with the precautionary principle and principles of sustainable development .¹⁷ The precautionary principle maintains that all the development risk that could decrease the chances for future environmental sustainability must be taken into consideration when decisions on product development are made. ¹⁸ Moreover, if the economic development of products is to become sustainable it must utilize renewable or non renewable resources at or below the rate at which they are created, and without exceeding the absorption and regenerational capability of the natural environment .¹⁹

In short, sustainable product development and manufacturing may be enhanced through the consideration of all the relevant environmental requirements ²⁰ related to the use of South Africa's indigenous plants. It therefore follows, that whichever indigenous plants in South Africa are utilized for the commercial development of indigenous beverages, precautionary steps must be taken to ensure long term economic and environmental sustainability. Indigenous beverages should only be commercialised when there is sufficient plant biomass in selected ecosystems to satisfy the demand and supply of raw materials. At all times, the harvesting of plant material from the wild to make products must be made within the tolerance limits consistent with the carrying capacity of feeder ecosystems. If this approach is followed the 'indigenous beverage' industry will produce economically viable products indefinitely and profitably without damaging natural resources, environmental quality and rural livelihoods. ²¹ This paper examines the commercial potential of selected indigenous beverages, namely, rooibos, honeybush and mountain tea.



The paper has the following research aims, namely, to determine (1) whether these indigenous beverages have been commercialised succesfully, (2) which markets are served by them, and (3) whether their industry can develop further in an environmentally sustainable manner. For these research aims, the economic viability and environmental sustainability of selected indigenous beverages is obtained from the analysis of data on their production trends, existing and future economic markets, as well as financial sustainability.

The research problem, rationale and scope for the study

The research is intended to determine whether there is a commercial basis for the existence of a viable, economically, and environmentally sustainable indigenous plant-based beverage industry in South Africa. To analyze this research problem selected indigenous plant-based beverages in South Africa, which form part of the industry are analyzed in greater detail for their commercial viability. In many countries indigenous beverages have been commercialised with great success, despite the competition from >imported= beverages. ²² Economic products like tequila, whisky, rum, and plum wine which originate primarily from Mexico, Scotland, West Indies, and Romania, respectively – are some of the few economically successful indigenous beverages in the world.

For the purpose of this paper only three non-alcoholic indigenous beverages – rooibos, honeybush and mountain tea – are analyzed in greater detail for their commercial potential in the indigenous beverage industry. The beverages are derived from the traditional use of the following indigenous plants, namely, *Aspalathus linearis, Cyclopia intermedia* (see figure 2 & 3), and *Athrixia phylicoides*. The latter plant is often harvested by rural women who live in the vicinity of the mountainous areas where it naturally grows (see figure 4)

Figure 2



Figure 2: *Aspalathus*, the genus to which the rooibos plant belongs



(Source:http://www.plantzafrica.com/plantab/aspalathus.htm - Acccessed-Feb 2006)

Figure 3



Figure 3: Specie of *Cyclopia intermedia* from which honeybush tea is made.



Figure 4: Women carrying bundles of *Athrixia phylicoides* plants for making tea and brooms.

Research methodology

Given the exploratory nature of the research undertaken the method of triangulation is followed. Data was collected from multiple sources, in the hope that they will converge to support a particular pattern, trend, or theory linked to the statement of the research problem.²³ Quantitative data on local production trends, markets and exports with regard to rooibos and honeybush tea are used to highlight the various economic aspects related to the indigenous plant-based industry. In keeping with the objectives of the method of triangulation ²⁴ the data was obtained from various sources, including document studies, literature review, the South African Export Directory, selected newspaper reports and some internet websites.



However, primary data on the development potential of mountain tea, traditionally prepared from boiling the leaves of the *Athrixia phylicoides* plant in water was obtained from a questionnaire survey. The *Athrixia phylicoides* plant grows naturally in mountainous areas of the Limpopo, Kwa-Zulu-Natal and the Eastern Cape provinces. The survey was conducted in the Gauteng province during the year 2002 and is part of an indigenous plant use project funded by the National Research Foundation (NRF) since the year 2001. It was conducted by means of questionnaires in three townships, namely, Mamelodi, Marabastad, and Soweto - all of which are located in the Gauteng province. These townships were selected because they are inhabited partly by black people who originate from rural areas where this indigenous tea is well known.

The economic characterisation of rooibos and honey bush tea was made in terms of the criteria and characteristics stated in the life cycle model (see table 2). The model is used in business strategy analysis .²⁵ According to this model economic products are born, their sales grow over time, they reach maturity, and they go into decline, and their market position ultimately fades away. Similarly, the life cycle of economic products is conventionally compartmentalized into four phases: introduction, growth, maturity, and decline. Grant ²⁶ states that the life cycle model has the characteristic S-shaped growth curve (see figure 5) and the stages within it are determined by evolutionary changes in an industry's growth rate over time (see table 2). Economic potential is defined as the total purchases that sales in a segment will likely make during a specified period of time. ²⁷ With the use of the life cycle model and data from multiple sources it has been possible to provide an economic overview of the selected indigenous bush teas, which are part of the indigenous beverage industry. The next section provides a brief historical background on rooibos and honeybush tea.

| Table 2. | Different | features | of the | industry | life cyc | le model |
|----------|-----------|----------|--------|----------|----------|-----------|
| Table 2. | Different | reatures | or the | muusu y | me cy | sie mouer |

| In the <i>introduction stage</i> , | In the <i>growth</i> stage there is | |
|--|--|--|
| sales are small marketing is niche sectors the rate of market penetration is relatively low industry's products are less known production scale is small high production costs distribution channels are specialised | accelerating market penetration product may spread into the mass market rapid product innovation building of a strong brand | |



| Table 2 cont. | |
|---|--|
| In the <i>maturity stage</i> there is | In the <i>decline</i> stage, |
| increasing market saturation slow growth as new demand gives way to new replacement demand direct or indirect replacement with new products | existing products are challenged by new products |

⁽Source: Grant, R 1998:243)





Brief economic history of indigenous bush teas

Tea is one of the most consumed beverage worldwide since it was first discovered in China in the form of the leaves of the indigenous plant *Camellia sinensis*, nearly 5000 years ago. ²⁸ The beverage has an important role to play in the life of many consumers, socio-cultural structures, the economy and the natural environment. ²⁹ Apart from China, many countries, including Japan, India, Sri Lanka, Indonesia and Kenya, play an important role in the international trade associated with the production and sale of tea. In addition, many countries in Europe and North America have a well established tea industry.³⁰



Depending on the degree of fermentation in the leaves after a period of harvesting, several varieties of tea can be distinguished, namely, green tea (non-fermented); oolong (semi fermented); and black or red tea (fully fermented). ³¹ These varieties serve different niche markets. ³²

South Africa is also known for indigenous type of teas which have the potential to become leading herbal tea substitutes. ³³ The teas are derived from the traditional use of plant material which belongs to the rooibos (*Aspalathus linearis*), honeybush (*Cyclopia intermedia*), and mountain tea (*Athrixia phylicoides*) plants, respectively. Unlike the mountain tea plant, rooibos and honeybush tea species are part of the fynbos biome which covers an area of nearly 70 000 km² in the Cape region of South Africa. Rooibos tea is harvested mainly from one indigenous specie (*Alpalathus linearis*) although about 270 species can be distinguished in the *Aspalathus* genus. ³⁴ In contrast, honeybush tea is derived from several indigenous species that are all found in a very restricted geographical range. ³⁵ Over many generations both teas have been used by the Khoisan descended people inhabiting the Cedarberg area as traditional or indigenous teas. ³⁶ Their production is still concentrated in the areas characterised as the fynbos biome (see figure 6).³⁷

However, the mountain tea plant, *Athrixia phylicoides*, is not yet propagated on a commercial basis although it is also suitable for domestication and development as a commercial health tea.³⁸ Geographically, its natural occurrence is restricted to the north-eastern mountainous parts of South Africa, from the Eastern Cape province in the south to the Soutpansberg in the Limpopo province in the north (see figure 7)³⁹.





Figure 6: Areas providing natural habitats for the Aspalathus linearis and Cyclopiaintermediaspecies(Source:Dharmanada,2005,http://www.itmonline.org/arts/honeybush.htm, Feb 2006).



Figure 7: The geographical distribution of the different areas where *Athrixia phyllicoides* naturally occurs (Source Rampedi & Olivier, 2006, in press)

As early as 1910 attempts were made to propagate and cultivate bush teas (see figure 8) in order to satisfy a growing economic demand in the health tea market. ⁴⁰ However, it is only in the late 1990s that the economic potential of rooibos and honeybush tea was exploited further. As a result the amount of income generated by the indigenous tea industry in South Africa is estimated at R 475 million, with rooibos tea sales contributing over 90 per cent of this figure. ⁴¹ The growing market penetration of bush teas is largely attributed to the rising health consciousness worldwide, possibly accentuated by a number of researches conducted during the last ten years or so.



Figure 8: A plantation of *Aspalathus linearis* plants from which rooibos tea is made.(Source:http://www.mrc.ac.za/promec/antimutagenicity.htm-Accessed Feb 2006)



These researches indicate that bush teas like rooibos and honeybush have: no caffeine, very little tannins and significant amounts of polyphenols with antioxidant properties .⁴² And from the viewpoint of supply chain management fewer handling problems are experienced with them since they do not require any refrigeration during transport or storing.⁴³

Two official organizations have been formed by local farmers in the Cape region to ensure that there are reliable supplies of 'bush teas' for the indigenous tea industry, namely, (1) the Rooibos Tea Control Board (RTCB) and (2) the South African Honeybush Producers Association (SAHPA).⁴⁴ The commercialisation of rooibos and honeybush teas are largely ascribed to the early pioneering efforts of these two organizations. Apart from these organizations there are rural community-based organizations in the Cape region that are designed to help alleviate the impact of overharvesting, grazing and invasion by alien plant species on existing indigenous tea plants.⁴⁵ These organizations are also involved in the empowerment of resource-poor rural communities who have an interest in cultivating bush teas. Specifically, the non-profit organization, Agribusiness in Sustainable Natural African Plant Products (ASNAPP), is playing an important role in this regard. This involves the provision of entrepreneurial support to poor rural communities. ⁴⁶ For example, in the year 2004, ASNAAP initiated several projects with rural communities in the Cedarberg area of the Cape region to enhance market accessibility of small groups of local growers. As a result, close to R 2 million has accrued to three rural communities involved in the cultivation of rooibos and honeybush tea plants in that year. Against this background, the commercial significance of each of the indigenous teas will be discussed.

The agricultural development and marketing of rooibos tea

Rooibos tea is the first bush tea to be commercialised in South Africa. South Africa produce on average nearly 4500 tons of rooibos tea per year .⁴⁷ Historically, the Rooibos Tea Control Board (RTCB) has played an important role to stabilise the new 'bush tea' market given seed shortages and price fluctuations immediately after the Second World War.⁴⁸ The producers and marketers of rooibos tea were also challenged by the problem of poor product quality, especially microbial contamination, which nearly led to the demise of the industry in 1984 .⁴⁹ Consequently, other reasons ⁵⁰ for the establishment of the RTCB were as follows:

- need for quality control
- need for grading of the tea,
- orderly marketing of the tea,
- further market research to improve exports.

Farmers involved in the cultivation and harvesting of rooibos tea had a contractual obligation to sell their produce only to the RTCB which was responsible for the marketing function. The agricultural value of rooibos tea was uncovered during the period between the years 1920 and 1930 in the Clanwilliam area located in the Cape region.⁵¹ The tea is produced in deep acid sandy soils in the winter areas of the Western Cape and the Northern Cape. ⁵² It is imperative to recognize that apart from these natural habitats, there are no alternative sources of original material supply anywhere in the world. ⁵³ Consequently, the term 'rooibos' refers to the indigenous tea produced in a particular geographical region in South Africa. The tea comes in different flavours and is available nationally in retail supermarkets, wholesalers and health shops. ⁵⁴



Around 1991 total sales of rooibos tea were in the region of 4 000 tons, and exports only about 12 per cent of the total production. ⁵⁵ At that stage total revenues emanating from retail and export sales totalled R10 million. However, the rooibos tea market has grown substantially since that time to the extent that the South African National Department of Agriculture classifies rooibos as a horticultural product in the same category as deciduous and other summer fruit and vegetables. ⁵⁶ And following its successful marketing, the RTCB has recently become a private company known as Rooibos Limited. ⁵⁷The company is currently handling approximately 70 percent of sales, making it the biggest producer and marketer of rooibos in domestic and international markets. ⁵⁸

Since the year 2000 about 30 per cent of the local production of rooibos, which averages nearly 6 000 tons, is exported to different international markets. ⁵⁹ The tea is marketed in over 30 countries. ⁶⁰ The amount of rooibos tea exports has been increasing rapidly between the years 1998 and 2005. ⁶¹ In economic terms, the rate of increase exceeds 200 per cent. However, it is important to recognize that at other times the sales were growing at a much slower rate. For instance, for nearly five years, total sales of the tea ranged from 3 800 tons in 1988 to nearly 4 000 tons in 1991. ⁶² Given this latter rate of increase, it appears that rooibos tea sales have developed over a relatively longer period of time. Sales only accelerated markedly in the decade between the years 1995 and 2005, possibly due to growing market acceptance. Germany is the leading export destination of the tea as it accounts for 64 percent of the total international sales (see table 3). It is followed, in descending order, by the Netherlands, United Kingdom, Japan, United States of America, Poland, Russia, Oslo, and other countries (see table 3). ⁶³

Table 3: Percentage amounts of rooibos tea exported to selected countries during the year 2004.

| Name of the country | Percentage (%) exported |
|--------------------------|-------------------------|
| Germany | 64 |
| Holland | 10 |
| United Kingdom | 8 |
| Japan | 6 |
| United States of America | 3 |
| Poland | 2 |
| Russia | 1 |
| Oslo | 1 |
| Rest of the world | 5 |

(Source: Adapted from data in the Export Directory, 2005 and Rooibos Limited, 2005).



The volume of exports is expected to double in the next few years because of growth in new international markets. ⁶⁴ These markets are located in the Far East, Singapore, Australasia, and Scandinavian countries. Furthermore, table 4 indicates a summary of the foreign earnings emanating from rooibos tea exports over a period of 10 years. ⁶⁵ In total the earnings during the same period amount to R 374 million. These earnings have been increasing steadily from the year 1995 to the year 2004 - R 14 million to R 100 million, respectively, except for the years 1999 and 2001 when agricultural production in South Africa was affected by regional droughts. ⁶⁶ The impacts of droughts affect many sectors of the South African economy, particularly the agricultural and the industrial sectors. Similarly, the rooibos tea industry was negatively affected since droughts have a tendency to lead to sharp increases in producer prices. ⁶⁷ If producer prices escalate, rising costs eventually cascade into the marketing value chain, often with negative consequences for retail sales .

| Year | Foreign earnings |
|----------------|------------------|
| 1995 | R14 million |
| 1997 | R 50 million |
| 1999 | R 20 Million |
| 2001 | R70 Million |
| 2002 | R120 Million |
| 2004 | R100 Million |
| Total earnings | R 374 Million |

Table 4: A summary of foreign earnings derived from rooibos tea exports.

(Source: Carter ,2005: http://www.american.edu/ted/rioba.htm Accessed October 2005) In terms of the life cycle model explained earlier, rooibos sales are in the growth phase ⁶⁸ by virtue of the following characteristics:

- readily increasing market penetration,
- emergence of a strong (rooibos) brand,
- rapid process innovation to improve quality, and
- steps towards mass production.



The market base of the tea is currently expanding and this evidence is presented in table 3 and table 4. Apart from these characteristics other sources of data also confirm the existence of a growth phase in the development of rooibos tea markets. For instance, in 1980 and 1990 export earnings from rooibos sales were as little as R 2.1 million and R10.2 million, respectively.⁶⁹ However, in the year 2004 and 2005 they have improved to a staggering R 260 million. It is interesting to observe that the popularity of this indigenous beverage is increasing not only in the international markets but also in the domestic market. For example, the tea has recently been identified as one of the ten most frequently consumed beverages in some of the informal settlements located in the Vaal Triangle area of South Africa.⁷⁰ And apart from its use as indigenous tea, it is also used as an active ingredient in cosmetics, weight control products, baking and cooking; a cure for insomnia; and as a remedy for allergic babies. ⁷¹ In fact, there is an additional highly successful comprehensive rooibos-based product family established through a long term marketing partnership with the company, Forever Young (Pty) Ltd. ⁷² The number of individual products marketed in this strategic alliance exceeds 100. However, unlike rooibos tea, the products are sold by means of direct selling ⁷³ which entails a detailed personal explanation of a product by a sales representative with an opportunity to sell. ⁷⁴

Thus it can be seen that beyond the beverage-related properties of the tea, there is a myriad of products which contribute to the commercial success of the rooibos brand. The next section discusses the commercial aspects of another bush tea - derived from the indigenous use of honeybush species.

The historical and commercial aspects of honeybush tea

Honeybush tea is the second indigenous bush tea to be commercialised in South Africa. The development of honeybush into a commercial crop and viable agribusiness began in the 1990s⁷⁵, although the traditional use by the Khoisan rural communities in the Cape region started many generations ago. The tea is a herbal infusion prepared from the honey-scented flowers and leaves of the South African fynbos *Cyclopia* plants. ⁷⁶ Apart from its use as bush tea the Khoisan communities recognized its medicinal properties in the treatment of coughs and other respiratory ailments. As a result various research initiatives have been undertaken since the 1990s to examine its phytochemical aspects. ⁷⁷ Its medicinal and herbal properties are attributed to a number of chemical compounds which give it anti-oxidant and anti-diabetic properties. ⁷⁸

South Africa produce on average nearly 200 tons of honeybush tea per year ⁷⁹, 20 times smaller than volumes traded for rooibos tea. However, as early as 1898, this indigenous tea was already regarded as a tea substitute listed in the King's American Dispensatory. ⁸⁰ Although it is still gathered from wild populations there are formal agricultural programmes designed to propagate the plants and improve supply because of growing economic demand. ⁸¹ One such programme is managed by SAHPA and the goal is to produce at least 100 000 or more plants through a network of local growers to prevent the negative impacts of overharvesting from the wild.⁸² Clearly, this programme is in harmony with the precautionary principle and it is environmentally and economically sustainable given that some biological species of *Cyclopia* from which the original indigenous tea was made are already becoming scarcer due to the impacts of overharvesting.



⁸³ Examples of such endangered species include the *Cyclopia genistoides*, which is no longer used to any great extent. The species which are sustainably propagated in the main production area at Langkloof, near Port Elizabeth, for commercial purposes are the *Cyclopia intermedia* and *Cyclopia subternata*. With sustainable propagation and commercialisation of selected *Cyclopia* species many rural communities in the Cape region benefit financially from employment opportunities. ⁸⁴

Distribution and marketing aspects of honeybush tea

With respect to distribution channels and marketing, honeybush tea is obtainable from roadside stalls, specialist health shops and retail supermarkets in South Africa.⁸⁵ In addition, the tea is also exported.⁸⁶ Many countries such as Germany; United States of America; Netherlands; United Kingdom; Norway; Canada; Oslo; and Japan import honeybush tea every year (see table 5). However, amongst them Germany is the largest importer, constituting 71 per cent of the total exports (see table 5). Nevertheless, one common attribute of these export markets is that their geographical location is all in economically affluent high-income countries. Possibly the consumers of honeybush tea in these countries are part of a wealthy, specialised and innovation-oriented niche sector. Niche marketing, therefore, appears to be an attractive strategy for organizations involved in the commercialisation of bush teas.⁸⁷ However, SAHPA is penetrating these specialised exports markets by establishing strategic alliances with international partners in view of its limited marketing and financial resources.⁸⁸

| Name of the country | Percentage (%) exported |
|--------------------------|-------------------------|
| Germany | 71 |
| United States of America | 13 |
| Netherlands | 4 |
| United Kingdom | 3 |
| Norway | 2 |
| Canada | 2 |
| Oslo | 1.5 |
| Japan | 1 |
| Rest of the world | 2.5 |

Table 5: Percentage amounts of honeybush tea exported to selected countries during the year 2004.

(Source: Adapted from data in the Export Directory (2005) and Rooibos Limited, 2005). Honey bush tea sales and export volumes for the 2001-2002 and 2002-2003 periods have increased significantly although prior to the year 2001 there was very little.⁸⁹ For instance, for the periods 2001-2002 and 2002-2003 over 120 tons and 140 tons of honeybush tea passed for export markets, respectively. In comparison with rooibos tea, the amounts of honeybush



tea traded in export markets are smaller.⁹⁰ However, it is imperative to recognize that honeybush tea sales are peaking relatively faster than was the case for rooibos tea. For example, since the year 2000 honeybush tea sales have grown at an exponential rate. ⁹¹ Whereas only 30 tons of the tea was sold in 1997, in the year 2000 the quantity was estimated around 160 tons and it was expected to exceed 300 tons by the year 2004. In economic terms, this imply that sales were projected to grow by nearly 300 per cent between the years 1997 and 2000, and by 150 percent between the years 2000 and 2004 (see table 6).

Table 6: Estimates of honeybush tea produced in tons

| Year | Amount of plant material processed (tons) |
|------|---|
| 1997 | 30 tons |
| 2000 | 160 tons |
| 2004 | 300 tons |

(Source: Dharmanada, 2005 ;www.itmonline.org/arts/honeybush.htm -Accessed Aug 2005)

These estimates illustrate a phenomenal growth rate despite the fact that the honeybush tea market is still in the introduction phase. As far as this phase is concerned, the following distinguishing (life cycle model) characteristics of the tea can be highlighted:

- sales are relatively smaller,
- greater potential for sales to grow rapidly,
- marketing is in niche sectors,
- consumers are in high income markets, and
- distribution channels are specialised.

Furthermore, it appears the tea is commercialised further at a far more favourable time in the indigenous 'bush tea' industry when market acceptance has already developed. Clearly, the long economic history of developing and marketing rooibos tea has paved the way for the development of this indigenous tea, and probably for others to come. The next section details some prospects linked to the sustainable development of yet another indigenous tea, derived from Athrixia phylicoides plants.

The commercial potential of the traditional health tea made from Athrixia phyllicoides

Like other bush teas, the indigenous tea derived from the Athrixia phylicoides plant is consumed mostly by rural communities located in the vicinity of the areas where it grows naturally. ⁹² The tea is made from an infusion derived from the leaves and twigs of the plant.



However, in recent years environmental concerns have been raised about the impacts of overharvesting *Athrixia phylicoides* plants by some of the rural communities, especially for the making of traditional brooms. In harvesting the specie for making the brooms the 'pickers' uproot the entire shoot of the plant. Inevitably, the specie is becoming scarcer, especially in the lower mountain slopes. ⁹³ However, during the last five years very interesting results related to the prospects for the sustainable commercial development of the herbal tea made from *Athrixia phylicoides* have emerged from the indigenous plant use (IPU) research conducted by the University of South Africa (UNISA). The research is multidisciplinary and was partly carried out by surveys not only in the rural areas where the plant naturally grows naturally , but also in the three urban townships of the Gauteng province of South Africa. The Gauteng province has the largest concentration of urban black population in the country. The purpose of the survey were to determine existing indigenous knowledge and marketing prospects related to this indigenous tea.

Out of the150 respondents interviewed in the urban survey, nearly 60 per cent indicated that they know the indigenous tea derived from *Athrixia phylicoides* very well. All the respondents who know this indigenous tea also indicated that they would buy the tea if it was available in the surrounding retail outlets, including supermarkets and informal township stores known as *spazas*. Respondents have indicated that the raw material for the tea is obtained from either harvesting it directly in the natural habitats or as gifts from friends and relatives who live in the rural areas. Another group of respondents obtain it by buying the dried plant material from *muti* herbal shops located around areas where the surveys were conducted.

It was also highlighted in the survey that the plant has stimulant and medicinal properties. According to further studies undertaken in the IPU project, the traditional use of the tea by rural communities appear to be related to the following phytochemical properties – no toxicity, high concentration of antioxidants and polyphenols, anti-bacterial and anti-fungal properties – of the *Athrixia phyllicoides* plant. ⁹⁴ Given these research findings, the IPU project is investigating how the mountain tea plant can be sustainably propagated in suitable production areas in the Limpopo and Kwa-Zulu-Natal provinces. The purpose is to ensure that when products with economic potential are developed in the future there is sufficient *Athrixia phylicoides* plant population to satisfy demand. This can also help alleviate the amount of environmental pressure resulting from the unsustainable use by rural 'harvesters' and so called 'biopirates'.

Conclusion and recommendations

This paper has provided an economic overview related to the sustainable commercial development of three non-alcoholic indigenous beverages. These beverages are derived from the traditional use of indigenous plants in mostly rural communities. By making use of the method of triangulation – obtaining data from different sources - the study has revealed that two of the selected beverages are an integral part of the indigenous plant-based beverage industry in South Africa. The indigenous 'bush tea' industry is estimated to value more than R 450 million and has great potential to grow further in the future as demand is improving in the domestic as well as several international markets. Economic markets for these teas have been identified as well as their extent of market penetration.



Whereas rooibos tea is in the growth phase, honeybush tea is still in the infancy or introduction phase. Nonetheless, the latter indigenous tea is already earning foreign exchange for the South African economy.

Invariably, the commercial successes of these beverages is attributed to the role of the different organizations involved in their marketing value chain – notably the (1) Rooibos Limited; (2) South African Honeybush Producers Association, and (3) ASNAPP, a non-profit organization empowering and promoting the market accessibility of poor rural communities. The indigenous tea made from *Athrixia phylicoides* is identified as one of the indigenous teas with great market potential given the results of a survey conducted in the three townships located in the Gauteng province and its phytochemistry.

However, the environmental risk associated with overharvesting, the threat and impacts of invasive alien vegetation where the indigenous plants grow, and inappropriate uses must be reduced or eliminated if the 'bush tea' industry is to grow to its maximum commercial potential with mutual benefits to all the role players, including rural communities.




CROP PRODUCTION PLANNING THROUGH EFFICIENT USE OF NATURAL RESOURCES FOR SUSTAINABLE AGRICULTURE

DharmPal MALIK

Department of Agricultural Economics CCS Haryana Agricultural University,India dpmalik@ hau.ernet.in

Over exploitation and degradation of natural resources under green revolution has become a major threat in region of India which experienced green revolution in very first stage of its introduction. The adoption of monoculture specialized and high chemical input use agriculture has led to severe environmental damage and resource degradation. The shrinking of natural resources coupled with technology and public policy related problems have caused increase in cost of production over the years. Considering various factors like optimization of agriculture productivity and profitability, employment generation, natural resource conservation and reduction in agro- chemical use, the objectives framed were i) to study utilization pattern of land, water and agro-chemicals ii) to reschedule the crop enterprise combination and resource use pattern to formulate suitable sustainable farm plans . The study was carried out in Haryana being one of the states of Indian Union which experienced green revolution in the first instance of its introduction has witnessed impressive increase in food grains production from 25.92 to 131.93 lakh tones during the period 1966-2004. Moreover, it improves its relative position in terms of per capita income and second in position for contributing to national food grain pool. The data with regards to land use pattern, irrigation water, cropping pattern etc. were scanned from various published sources. The gross returns for different crop enterprises were calculated by taking average productivity of a particular crop for triennium ending 2004 and post harvest prices of current year. Simple percentage, average and ratio statistical tools were applied for analysing the utilization pattern of resources. General Algebric Modelling System (GAMS) was employed to make rescheduling of resources on sustainable lines.

The results of the study reveal that area under forests does not indicate any appreciable increase over the years. The cropping pattern exhibited the acreage concentration of resource exhaustive and less risky crops like cotton, wheat, sugarcane and paddy and most of irrigation water were used amongst these crops. Increased consumption of nitrogenous fertilizers and pesticides, continuation of same cropping pattern over the time period resulted into accentuating the area under problematic soils, depletion of underground water, infestation of weeds, insect-pests and diseases. The optimal sustainable production plans showed increase in gross returns as well as accrued benefits through saving the water and agro-chemicals. The optimal plans in incorporated the crop enterprises like green gram, black gram, soybean, groundnut etc not only improved the soil health but also reduction in use of natural resources and agro-chemicals. The optimal plans further make sure to accommodate the economic, ecological and social aspects paving the path for sustainable development in agriculture. The agro-climatic zone wise planning of agriculture is also essential for sustainability of crop production.



INTRODUCTION

Green Revolution triggered in India with the introduction of high yielding varieties of crops particularly wheat and rice in seventies. The cultivators rapidly adopted these varieties in North India, which produced high yields by greatly responding to modern inputs, generation of suitable crop production and protection technologies and favourable public policies. With the increase in crop yields from modern farming techniques, reaching plateau and the mounting environmental problems. The adoption of monoculture, specialized and high chemical input use agriculture has led to severe environmental damage and resource degradation

The bio-chemical technology introduced in the mid-sixties has been the major exogenous technological change witnessed by Indian agriculture. No doubt, India has emerged from a food deficit to self-sufficient. But for increasing production of food and non-food crop output, the continuation of same cropping patterns over the last three and half decades with inefficient and unprincipled use of agro-chemicals inputs as well as natural resources have resulted into mounting several problems. About 60 percent of the land in the country suffers from soil erosion, water logging and salinity. Natural resource base is continually under a state of stress and degradation due to efforts at boosting agricultural production to meet especially the demand of foodgrains. The shrinking of natural resources coupled with technology and public policy related problems have caused increase in cost of production over the years.

The sustainability of agriculture seldom considered a national concern a few decades ago is now an important policy issue (Allen, 1993). The sustainable agriculture refers to an agriculture that will continue indefinitely to produce abundant and wholesome food in socially desirable ways, will not degrade natural resources and the environment, will protect health and safety and be economically rewarding for the farmers. Sustainable agriculture is further explained as the successful management of resources to satisfy the changing human needs, while maintaining or enhancing the quality of environment and conserving the natural resources (CGIAR).Presently, now challenge are to be faced not only how exploit natural resource base to fulfil our growing demands for food and non-foods but also to conserve and sustain our environment. Therefore, the option opens is to iterate in between the losses and gains of the present technology and the input use in vogue and make gradual shift towards the sustainable crop production plans keeping in view the present and future needs.

STUDY AREA

Haryana being one of the states of Indian Union experienced Green Revolution in the first instance of its introduction has exhibited impressive manifold increase in foodgrain production from about 25.92 lakh tonnes in 1966-67 to 131.93 lakh tonnes in 2003-04. More, it ranks second next to Punjab state in productivity of all most crops and second largest contributor to national food grain pool. In addition, it also produces a large quantity of cotton, oilseeds, sugar, vegetables, flowers and animals products such as milk, eggs and broilers. About 84 percent of net sown area is irrigated using various irrigation sources like canal water, tubewells, micro irrigation system (sprinkler and drip irrigation water saving technologies).



The expansion of wheat and paddy area has nearly halted, growth in their productivity is observed from data recorded has been slowed and productivity growth appear to be achieved highest potential. Declining soil fertility, organic matter loss, water induced land degradation, depletion /raising water table, increasing nitrate content in ground water and soil, hazardous residual contents in food and fodder chain and threat to flora and fauna need great attention. The main threat to agriculture is diminishing natural resource base in two ways, by depletion and contamination. Both problems have an impact far beyond agriculture, in that resulting loss of food production and environmental damage threaten and diminish quality of life. Considering various factors like optimization of agriculture productivity and profitability, natural resource conservation and reduction in agro- chemical use, the following objectives were framed for the present investigation:

OBJECTIVES

i) to study utilization pattern of land, water and agro-chemicals in perspective.

ii) to reschedule the crop enterprise combination and resource use pattern to formulate suitable sustainable farm plans.

METHODS AND MATERIALS

The paper is based primarily on secondary data scanned from various issues of Statistical Abstracts of Haryana for the period 1981-2004, publications of Departments of Agriculture and Irrigation, Government of Haryana, publications of CCS Haryana Agricultural University, Hisar and other published sources. The gross returns from different crops were calculated by taking average productivity of a particular crop for the triennium ending 2003-04 and multiplying by the post- harvest price for the year 2003-04. The crop- wise detailed information has been presented in table 1. The average input prices considered for the water (Rs./metre ha.) fertilizers (Nitrogen, Phosphorous and Potash in Rs./ kg in nutrient) and pesticides (Rs./ kg/ litre) were calculated were Rs. 2080, Rs.10.43, Rs.16..35, Rs.5.24 and Rs.238, respectively.



| Table | 1: | Water, | Fertilizer | requirements | (recommended) | pesticides | consumption | and |
|-------|----|----------|-------------|----------------|---------------|------------|-------------|-----|
| | | gross re | turns of di | fferent crops. | | | | |

| Sr.No. | Crop | Recommended | Recomme | nded f | ertilizer | Pesticides | Gross |
|--------|-----------|-------------|-----------|--------------|-----------|-------------|-----------|
| | | water | requireme | ent (kg/ha.) | | consumption | return |
| | | requirement | Nitrogen | Phosphorous | Potash | (%) | (Rs./ha.) |
| | | (metre ha.) | | | | | |
| 1. | Paddy | 1.300 | 150 | 75 | 60 | 11.00 | 18397 |
| 2. | Pearl | 0.225 | 40 | 20 | - | 2.20 | 3986 |
| | millet | | | | | | |
| 3. | Maize | 0.350 | 150 | 60 | 60 | 1.00 | 10431 |
| 4. | Wheat | 0.325 | 150 | 60 | 60 | 5.50 | 24784 |
| 5. | Barley | 0.225 | 112 | 60 | 30 | 1.00 | 10885 |
| 6. | Sunflower | 0.450 | 80 | 60 | - | | 13785 |
| 7. | Chickpea | 0.115 | 15 | 40 | - | 1.50 | 12071 |
| 8. | Rapeseed | 0.175 | 40 | 20 | - | 4.50 | 15771 |
| 9. | Cotton | 0.450 | 150 | 60 | 60 | 22.50 | 14832 |
| 10. | Sugarcane | 1.450 | 150 | 60 | - | 7.00 | 47980 |
| 11. | Potato | 0.350 | 150 | 50 | 100 | 1.50 | 27510 |
| 12. | Red gram | 0.200 | 15 | 40 | - | 1.00 | 8977 |
| 13. | Green | 0.200 | 15 | 40 | - | 1.00 | 8029 |
| | gram | | | | | | |
| 14. | Soybean | 0.200 | 25 | 80 | - | - | 9018 |
| 15. | Lentil | 0.200 | 15 | 40 | - | - | 11545 |

General Algebric Modelling System (GAMS) Technique was employed to make the rescheduling of resources on sustain lines. For deriving optimal plans, the format of the model was given below.

Format of Model

$$\begin{array}{rcl} \text{Maximise Z} & \stackrel{n}{\succ} & \stackrel{\sum}{\sum} & c_j \, x_j & & \dots & (1) \\ & & j=1 & & \\ \text{Subject to} & & \stackrel{\sum}{\sum} & a_{ij} \, x_j & < b_i \, (\, i=1,2,3...m) & \dots & (II) \\ & & j=1 & & \\ & & & x_j > o \, (\, j=1,2,3...n) & \dots & (III) \\ & & & Z & = & \text{Total returns over operating expenses in rupees} \\ & & & x_j & = & \text{Level of jth activity} \\ & & & c_j & = & \text{Return over variable cost per unit of jth activity} \\ & & & a_{ij} & = & \text{Requirement of ith resource per unit of jth activity} \\ & & & b_i & = & \text{Quantity of the ith resource.} \end{array}$$



The crops like wheat, paddy and cotton having more requirements of water and agrochemicals were substituted crops with requiring less of these inputs with 10, 15 and 20 percent area reduction (Table 2). After long discussion with crop scientists, crops were substituted having importance in maintaining and improving soil health. The existing area of a crop considered as an average area of the crop during the preceding three years. For the pesticides consumption, the average consumption for period 2001-04 was taken in account and then on the based on the opinion survey of entomologist, the crop-wise consumption (in percentage) was worked out. Besides crop acreages, water and fertilizers availabilities were used as constraints to formulate the possible alternative crop production plans at various levels of area substitution .The input-output prices as well as productivity levels were remains constant in all the plans.

| Sr. No. | Area reduction (10%.15 and 20%) in crop | Area substitution crops |
|---------|---|---|
| 1. | Paddy | Soybean+ red gram + green gram |
| 2. | Wheat | Sunflower+ chickpea+ rapeseed+ potato +lentil |
| 3. | Cotton | maize+ red gram+ green gram |

Table 2: Area replacement and substitution of crops

RESULTS AND DISCUSSION

Land use pattern

It is evident from the table 3 that there has not been any substantial change in area under forest during the period 1980-2004. The forest area showed the sign of rising trend upto 1991-92 failed to maintain and declined to ever lowest figure of 45 thousand hectares in 2003-04. On average, the forest area in the state accounted for 3.53 percent of total geographical area. Barring the years 1987-88 and 1992-93 more than 80 percent of the area has been utilized for crops. More than half of the net sown area (except few years) has been double cropped. The cropping intensity was recorded as high as 181.27 percent.



| Year | Total area | Forest area | Land not available for cultivation | Permanent pastures and other grazing land | Culturable waste | Current fallow | Net sown area | Area sown more once | Total cropped area | Cropping intensity |
|---------|---------------|----------------|--|--|---------------------|-------------------|---------------|------------------------------|--------------------------|-----------------------|
| 1980-81 | 4405 | 132 | 434 | 30 | 30 | 177 | 3602(81.77) | 1860 | 5462 | 151.64 |
| 1981-82 | 4405 | 134 | 425 | 25 | 41 | 120 | 3660(83.09) | 2166 | 5826 | 159.18 |
| 1982-83 | 4405 | 136 | 417 | 27 | 48 | 170 | 3596(81.84) | 1710 | 5306 | 147.55 |
| 1983-84 | 4394 | 130 | 405 | 27 | 47 | 185 | 3600(81.93) | 2088 | 5688 | 158.00 |
| 1984-85 | 4391 | 132 | 402 | 27 | 46 | 168 | 3616(82.35) | 1896 | 5512 | 152.43 |
| 1985-86 | 4391 | 166 | 392 | 28 | 23 | 168 | 3613(82.28) | 1988 | 5601 | 155.02 |
| 1986-87 | 4391 | 169 | 390 | 28 | 23 | 158 | 3622(82.49) | 2040 | 5662 | 156.32 |
| 1987-88 | 4391 | 166 | 405 | 30 | 23 | 528 | 3233(73.63) | 1453 | 4686 | 144.94 |
| 1988-89 | 4391 | 166 | 398 | 26 | 25 | 209 | 3564(81.16) | 2448 | 6012 | 168.69 |
| 1989-90 | 4380 | 168 | 391 | 21 | 29 | 175 | 3593(82.02) | 2058 | 5651 | 157.28 |
| 1990-91 | 4378 | 169 | 417 | 23 | 21 | 169 | 3575(81.66) | 2344 | 5919 | 165.57 |
| 1991-92 | 4385 | 170 | 379 | 25 | 43 | 256 | 3508(80.00) | 2062 | 5570 | 158.78 |
| 1992-93 | 4376 | 171 | 405 | 31 | 33 | 240 | 3492(79.78) | 2361 | 5883 | 167.61 |
| 1993-94 | 4374 | 167 | 413 | 29 | 38 | 209 | 3513(80.31) | 2302 | 5815 | 165.53 |
| 1994-95 | 4369 | 110 | 498 | 27 | 14 | 156 | 3559(81.46) | 2430 | 5989 | 168.28 |
| 1995-96 | 4398 | 110 | 494 | 24 | 23 | 156 | 3586(81.54) | 2388 | 5974 | 166.59 |
| 1996-97 | 4399 | 115 | 480 | 24 | 23 | 137 | 3615(82.18) | 2459 | 6074 | 168.02 |
| 1997-98 | 4402 | 115 | 441 | 25 | 37 | 149 | 3635(82.58) | 2508 | 6143 | 168.99 |
| 1998-99 | 4394 | 115 | 440 | 24 | 37 | 144 | 3628(82.57) | 2692 | 6320 | 174.20 |
| 1999-00 | 4400 | 115 | 464 | 22 | 23 | 219 | 3552(80.72) | 2477 | 6029 | 169.73 |
| 2000-01 | 4402 | 115 | 470 | 34 | 18 | 232 | 3526(80.10) | 2589 | 6115 | 173.42 |
| 2001-02 | 4372 | 115 | 425 | 25 | 30 | 173 | 3566(81.56) | 2752 | 6318 | 177.17 |
| 2002-03 | 4374 | 45 | 569 | 25 | 35 | 233 | 3458(79.05) | 2577 | 6035 | 174.52 |
| 2003-04 | 4374 | 45 | 532 | 25 | 36 | 192 | 3534(80.79) | 2854 | 6388 | 181.27 |

Table 3. Land use pattern in Haryana(000,ha.)

Note: Figures in parentheses indicate the percentage of the total area

Cropping pattern

The overall account of share of different crops in total cropped area for the state as whole is presented in table 4. The first four crops in percentage viz; wheat, pearlmillet, chickpea and paddy accounted for the highest share of total cropped area during the year 1980-81. But the order changed to wheat, paddy, cotton, rapeseed, sugarcane and pearlmillet in the year 2003-04 cereal based cropping pattern sharing more than 50 percent acreage indicate overall risk of crop concentration in the long run on a few crops instead of diversification. Thus, cultivators prone themselves to disaster and thereby set the stage for potential wide spread crop losses in future. Paddy, cotton, wheat and sugarcane being resource exhaustive crops put a severe drain on natural resources like water and soil micro-nutrients, thus posing threat on the long term sustainability of the existing scarce natural resource base.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

Table 4: Crop acreage in Haryana.

| Year | Area under crops (in percentage) | | | | | | | | | | Total cropped area | | | |
|-------------|----------------------------------|-------------|-----------|------------------|-------|------------|--------------|--------------|-------------------|----------------------|-----------------------|---------------|----------------|-----------|
| | Paddy | Sorg hum | Maiz e | Pearl- millet | Wheat | Barle y | Chickpe a | Other pulses | Grou ndnu t | Rapeseed &mustard | Cott on | Sugarca ne | Vegetable s | (000,ha.) |
| 1980- 81 | 8.86 | 2.51 | 1.30 | 15.93 | 27.08 | 2.28 | 13.22 | 1.33 | 0.11 | 5.48 | 5.79 | 2.07 | 0.71 | 5462 |
| 1981- 82 | 8.66 | 2.02 | 1.20 | 14.62 | 26.81 | 2.06 | 17.97 | 1.52 | 0.14 | 3.48 | 5.66 | 2.50 | 0.71 | 5826 |
| 1982- 83 | 9.22 | 2.18 | 1.06 | 14.67 | 32.48 | 1.55 | 9.59 | 0.98 | 0.14 | 3.06 | 7.48 | 2.77 | 0.68 | 5306 |
| 1983- 84 | 9.85 | 2.67 | 0.95 | 14.76 | 31.52 | 1.32 | 11.39 | 1.27 | 0.12 | 3.44 | 7.12 | 2.33 | 0.60 | 5688 |
| 1984- 85 | 10.11 | 2.78 | 1.12 | 13.58 | 32.93 | 1.22 | 11.28 | 1.28 | 0.15 | 5.82 | 5.34 | 2.10 | 0.78 | 5512 |
| 1985- 86 | 10.43 | 2.06 | 0.98 | 11.59 | 30.37 | 1.56 | 13.58 | 1.52 | 0.18 | 6.48 | 6.14 | 1.86 | 0.81 | 5601 |
| 1986- 87 | 11.09 | 2.67 | 0.96 | 13.67 | 31.48 | 1.22 | 10.79 | 1.20 | 0.12 | 5.01 | 6.72 | 2.21 | 0.67 | 5662 |
| 1987- 88 | 9.91 | 2.86 | 0.87 | 10.34 | 36.94 | 1.33 | 4.27 | 1.39 | 0.12 | 6.97 | 8.88 | 3.04 | 1.01 | 4686 |
| 1988- 89 | 10.01 | 2.57 | 0.72 | 13.07 | 30.39 | 1.06 | 10.73 | 1.38 | 0.05 | 6.37 | 7.20 | 2.17 | 0.71 | 6012 |
| 1989- 90 | 11.35 | 1.82 | 0.73 | 11.10 | 32.86 | 0.91 | 9.30 | 1.38 | 0.04 | 7.74 | 8.34 | 2.42 | 0.82 | 5651 |
| 1990- 91 | 11.17 | 2.19 | 0.59 | 10.28 | 31.26 | 0.85 | 10.97 | 1.57 | 0.04 | 8.00 | 8.29 | 2.50 | 0.73 | 5919 |
| 1991- 92 | 11.44 | 1.84 | 0.52 | 9.98 | 32.42 | 1.01 | 5.51 | 1.08 | 0.04 | 11.45 | 9.08 | 2.91 | 0.86 | 5570 |
| 1992- 93 | 12.09 | 2.02 | 0.53 | 10.87 | 33.54 | 0.90 | 6.63 | 0.94 | 0.04 | 9.60 | 9.10 | 2.36 | 0.66 | 5883 |
| 1993- 94 | 12.98 | 1.55 | 0.51 | 8.74 | 34.28 | 0.66 | 6.97 | 0.91 | 0.04 | 9.91 | 9.68 | 1.92 | 0.77 | 5815 |
| 1994- 95 | 13.29 | 1.84 | 0.45 | 9.50 | 33.15 | 0.83 | 6.71 | 0.94 | 0.04 | 9.67 | 9.29 | 1.98 | 0.66 | 5989 |
| 1995- 96 | 13.89 | 2.11 | 0.43 | 9.63 | 33.01 | 0.68 | 6.31 | 0.89 | 0.04 | 9.62 | 10.9 1 | 2.40 | 0.67 | 5974 |
| 1996- 97 | 13.67 | 2.12 | 0.42 | 9.39 | 33.21 | 0.56 | 5.68 | 0.82 | 0.03 | 10.09 | 10.7 4 | 2.67 | 0.66 | 6074 |
| 1997- 98 | 14.75 | 2.11 | 0.42 | 9.43 | 33.21 | 0.68 | 5.71 | 0.79 | 0.03 | 8.97 | 10.2 0 | 2.28 | 0.68 | 6143 |
| 1998- 99 | 17.18 | 2.05 | 0.31 | 9.69 | 34.62 | 0.57 | 5.64 | 0.28 | 0.01 | 7.88 | 9.22 | 2.02 | 0.71 | 6320 |
| 1999- 00 | 17.96 | 1.85 | 0.33 | 9.73 | 38.42 | 0.58 | 1.66 | 0.23 | 0.01 | 7.46 | 9.01 | 2.26 | 0.65 | 6029 |
| 2000- 01 | 17.24 | 1.79 | 0.25 | 9.94 | 38.50 | 0.72 | 2.03 | 0.31 | 0.05 | 6.68 | 9.08 | 2.33 | 0.69 | 6115 |
| 2001- 02 | 16.26 | 1.64 | 0.28 | 9.27 | 36.40 | 0.47 | 2.25 | 0.73 | 0.05 | 8.49 | 9.96 | 2.55 | 0.70 | 6318 |
| 2002- 03 | 15.01 | 1.87 | 0.26 | 8.51 | 37.56 | 0.50 | 0.91 | 1.27 | 0.04 | 10.06 | 8.59 | 3.13 | 0.72 | 6035 |
| 2003- 04 | 15.89 | 1.58 | 0.26 | 9.77 | 36.25 | 0.42 | 1.92 | 1.18 | 0.02 | 9.69 | 8.23 | 2.51 | 0.74 | 6388 |

Note: crops with negligible share in the total cropped area were excluded



Area irrigated of important crops

The assured supply of irrigation water in large part of the state had the mainstay of agricultural development. The area under pearlmillet indicated increasing trend. In case of gram also, area irrigated fluctuated over the years with a downward trend, it reached a high of 65.45 percent in 1987-88 (Table 5). This might be on account of shifting of pearlmillet and chickpea acreage to the more assured and less risky crops of paddy and wheat with increased availability of irrigation water. This trend of percentage area under irrigation under paddy, wheat, cotton and sugarcane followed the path of sustenance. This might be due to stability, responsiveness to improved production technology, modern inputs, high returns from these crops and Govt. MSP policy. With increased irrigation coverage, most of irrigation water was shared amongst paddy, wheat, cotton, sugarcane and the like crops while pearlmillet and chickpea got reduced area under irrigation. The area under irrigation also got reduced in case of oilseeds, pulses and coarse cereals.

| Year | Irrigat | ed area of | f major o | crops(in pe | ercentage | e) | Total area | Net sown |
|-------|---------|------------|-----------|--------------|-----------|-----------|------------|--------------------|
| | Paddy | Pearl | Wheat | Chickpea | Cotton | Sugarcane | irrigated | area |
| | | millet | | | | | to net | (000.ha.) |
| | | | | | | | sown area | |
| | | | | | | | (%) | |
| 1980- | 97.13 | 11.84 | 93.10 | 43.08 | 98.29 | 91.07 | 59.20 | 3602 |
| 81 | | | | | | | | |
| 1981- | 95.72 | 13.50 | 92.96 | 32.10 | 98.03 | 89.59 | 61.40 | 3660 |
| 82 | | | | | | | | |
| 1982- | 98.26 | 15.93 | 94.02 | 41.27 | 97.38 | 92.39 | 65.50 | 3596 |
| 83 | | | | | | | | |
| 1983- | 90.79 | 14.42 | 95.62 | 26.25 | 96.47 | 91.18 | 60.80 | 3600 |
| 84 | | | | | | | | |
| 1984- | 98.33 | 11.63 | 95.40 | 20.11 | 97.76 | 92.24 | 60.50 | 3616 |
| 85 | | | | | | | | |
| 1985- | 98.80 | 12.93 | 96.33 | 25.10 | 99.97 | 95.01 | 62.20 | 3613 |
| 86 | | | | | | | | |
| 1986- | 98.73 | 15.36 | 97.98 | 33.88 | 99.29 | 95.62 | 64.80 | 3622 |
| 87 | | | | | | | | |
| 1987- | 99.50 | 27.33 | 97.54 | 65.43 | 98.94 | 94.87 | 79.80 | 3233 |
| 88 | | | | | | | | |
| 1988- | 98.89 | 13.87 | 97.83 | 21.07 | 99.28 | 95.64 | 71.00 | 3564 |
| 89 | | | | | | | | |
| 1989- | 99.30 | 21.20 | 97.56 | 29.86 | 99.45 | 96.42 | 73.90 | 3593 |
| 90 | | | | | | | | |
| 1990- | 99.02 | 15.45 | 97.87 | 21.72 | 99.47 | 96.08 | 72.90 | 3575 |
| 91 | | | | | | | | |
| 1991- | 99.51 | 19.04 | 98.13 | 28.69 | 99.64 | 96.36 | 76.00 | 3508 |
| 92 | | | | | | | | |

Table 5: Irrigated area of important crops



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

| 1992- | 99.57 | 17.45 | 97.91 | 22.94 | 99.62 | 96.34 | 75.30 | 3492 |
|-------|-------|-------|-------|-------|-------|-------|-------|------|
| 93 | | | | | | | | |
| 1993- | 99.60 | 19.68 | 98.19 | 20.49 | 99.64 | 96.43 | 75.80 | 3513 |
| 94 | | | | | | | | |
| 1994- | 99.62 | 15.29 | 98.39 | 20.00 | 99.64 | 96.43 | 76.40 | 3559 |
| 95 | | | | | | | | |
| 1995- | 99.28 | 17.74 | 98.33 | 18.57 | 99.34 | 97.22 | 77.30 | 3586 |
| 96 | | | | | | | | |
| 1996- | 99.63 | 15.59 | 98.31 | 18.84 | 99.24 | 98.15 | 76.50 | 3615 |
| 97 | | | | | | | | |
| 1997- | 99.59 | 17.45 | 98.29 | 14.98 | 98.94 | 97.59 | 76.80 | 3635 |
| 98 | | | | | | | | |
| 1998- | 99.81 | 18.43 | 98.18 | 13.73 | 99.14 | 98.43 | 78.30 | 3628 |
| 99 | | | | | | | | |
| 1999- | 99.83 | 19.60 | 98.77 | 42.82 | 99.50 | 98.02 | 81.30 | 3552 |
| 00 | | | | | | | | |
| 2000- | 99.78 | 24.16 | 99.11 | 32.93 | 99.74 | 97.90 | 83.90 | 3526 |
| 01 | | | | | | | | |
| 2001- | 99.90 | 22.71 | 99.13 | 27.36 | 99.61 | 97.71 | 84.00 | 3566 |
| 02 | | | | | | | | |
| 2002- | 99.92 | 34.06 | 99.24 | 32.36 | 98.58 | 98.94 | 85.80 | 3458 |
| 03 | | | | | | | | |
| 2003- | 99.88 | 26.90 | 98.98 | 21.17 | | 99.42 | 84.00 | 3524 |
| 04 | | | | | | | | |

Table 5: Cont.

Use of agro-chemicals in crops

With the advent of the green revolution, the use of modern inputs, especially agro-chemicals has increased manifold, owing to responsiveness of high yielding strains to irrigation, chemicals etc. The consumption pattern of major plant nutrients viz; nitrogen, phosphorous and potash as well as pesticides as portrayed in table 6. From total use of fertilizers i.e. 64.08 kg/ha .in 1980-81,the consumption pattern shows an increasing trend (barring potash) has reached a high of 319.14 kg/ha in 2003-04 with contribution of nitrogen, phosphorous and potash being 239.93, 74.42 and 4.79 kg/ha., respectively. The overall emerging issue of the consumption pattern of nitrogen phosphorous and potash indicates the increasing trend over the years in respect of nitrogen followed by phosphorous and potash. The consumption of pesticides has also increased over the years with upward inclination up to 1991-92, thereafter, it exhibited declining trend. The ever increasing trend in pesticides consumption which has put a question mark on the sustainability of the present system has shown some sense of relief after the year1991-92 showing declining trend. Indiscriminate use of pesticides wipes out the natural enemies of pests, encourages the development of resistant strains of the pests and hazardous effect on human life.



| Year | Chemical Fer | | Pesticides | | |
|---------|--------------|-------------|------------|--------|----------------|
| | Nitrogen | Phosphorous | Potash | Total | (kg/litre/ha.) |
| 1980-81 | 52.02 | 8.70 | 3.36 | 64.08 | 0.060 |
| 1981-82 | 59.06 | 8.85 | 2.95 | 70.86 | 0.062 |
| 1982-83 | 60.12 | 10.38 | 2.70 | 73.20 | 0.073 |
| 1983-84 | 72.09 | 14.73 | 3.80 | 90.62 | 0.076 |
| 1984-85 | 75.43 | 15.55 | 2.11 | 93.09 | 0.086 |
| 1985-86 | 82.04 | 19.27 | 1.70 | 103.01 | 0.100 |
| 1986-87 | 90.29 | 22.63 | 1.61 | 114.53 | 0.110 |
| 1987-88 | 93.01 | 27.32 | 1.51 | 121.84 | 0.114 |
| 1988-89 | 107.63 | 33.56 | 1.67 | 142.86 | 0.125 |
| 1989-90 | 112.05 | 35.92 | 1.06 | 149.03 | 0.132 |
| 1990-91 | 125.32 | 39.02 | 1.42 | 165.76 | 0.147 |
| 1991-92 | 132.47 | 40.31 | 0.72 | 173.50 | 0.150 |
| 1992-93 | 132.47 | 40.31 | 0.72 | 173.50 | 0.149 |
| 1993-94 | 149.93 | 42.51 | 0.70 | 193.14 | 0.148 |
| 1994-95 | 159.38 | 42.24 | 0.75 | 202.37 | 0.143 |
| 1995-96 | 164.94 | 37.53 | 0.89 | 203.36 | 0.142 |
| 1996-97 | 172.66 | 38.81 | 0.86 | 212.33 | 0.139 |
| 1997-98 | 182.30 | 47.25 | 1.09 | 230.64 | 0.138 |
| 1998-99 | 184.78 | 62.35 | 1.43 | 248.56 | 0.139 |
| 1999-00 | 201.10 | 58.08 | 2.72 | 261.90 | 0.141 |
| 2000-01 | 202.58 | 58.51 | 2.74 | 263.83 | 0.142 |
| 2001-02 | 202.04 | 70.33 | 3.45 | 275.82 | 0.135 |
| 2002-03 | 220.29 | 66.58 | 4.94 | 291.81 | 0.137 |
| 2003-04 | 239.93 | 74.42 | 4.79 | 319.14 | 0.133 |

Table 6.Consumption of agro-chemicals in crops

Ground water quality, change in water table and extent of problematic areas

The overall repercussion associated with farm activities have changed the scenario of ground water quality, water table and increase in problematic area. Nearly 55 percent water seems to be unfit for crop production and water table is declining by 40 cm each year. The foregoing discussion discerns the fact that the average acreage under plough has reached its peak and it is likely to decrease with increased urbanisation. Creation of wide spread irrigation facilities, excessive use of canal water and the irrational use of crucial farm inputs have resulted in the problems of water logging, soil salinity, soil sodicity, etc. The use of micro irrigation system i.e sprinkler and trickle needs to be encouraged for enhancing water use efficiency.



Resource use pattern in crops

At present, the cultivators considering a change in farming practices is the likely economic outcome. Wider adoption of sustainable farming methods requires that they should at least be as profitable as existing methods along with non-monetary advantages without rapidly deteriorating soil and water resources. The major stress is laid on crop component, its diversification, crop mix and their visual impact on land, water use and consumption of agrochemicals. Based on these considerations and priority approaches, the General Algebric Modelling System (GAMS) Technique was used to work out the alternate optimal crop production plans.

In order of acreage, the major crops in the existing crop plan were wheat, paddy, pearlmillet, rapeseed, chickpea, cotton and sugarcane (Table 7). In the existing optimal production plan, there was no change in chickpea, cotton, sugarcane and potato acreages. Barley disappeared from the production plan where as area under paddy, maize and rapeseed increased. The changing crop acreages under different suggested optimal crop plans give vivid picture of constant acreage under pearlmillet, cotton and sugarcane. The acreage under chickpea, potato, red gram, green gram, soybean and lentil got substantially increase in the subsequent production plans while there was declining trend for rapeseed. Wheat and paddy witnessed declining trend in the optimal crop production plan-III. Barley escapes its inclusion in all optimal crop production plans while maize excluded in optimal plan-III. The increasing acreage under pulses, oilseeds and other leguminous crops with decreased area under paddy, wheat and cotton in the optimal crop production plans made a better change for crop rotation and the crop mix. Finally, it will help in attaining the ultimate objective of lessening the use of irrigation water, enhancing soil fertility and agro-chemicals, thereby paving the path for the sustainable agriculture.

Input use pattern in crops

The basic aim is to reduce the use of crucial farm resources like water and agro-chemicals without causing any adverse impact on farm income. In all other production plans, the water requirement indicated declining trend (Table 8). But it came down to 2612.71 thousand metre hectares in the optimal crop plan-III. The gradual reduction in fertilizer requirement in the subsequent production plans seems to be virtual possibly with maximum reduction of 9.87 percent in the optimal crop production plan-III. Barring the potash consumption in the subsequent optimal crop production plans, the nitrogen and phosphorous consumption got reduced up to 11.17 and 4.12 percent, respectively in the suggested optimal crop production plan-III. The pesticide consumption pattern exhibits down trend. From 3217.68 thousand kg in the existing plan, it reached to 3343.52 thousand kg in the optimal production plan and from there to 3342.81 thousand kg in the suggested optimal production plan-III, indicating thereby an increase of 3.89 percent over the existing optimal crop plan. Although, there is not much increase on pesticides front, on account of increasing potato acreages. The reducing phenomenon consequent upon the changed crop acreage in the optimal crop production plans will improve soil health and productivity, enhance biotic activity and limit the adverse hydrological change.



| Table 7: | Existing | and | suggested | crop | plans | (000. | .ha.) |
|----------|----------|-----|-----------|------|----------|-------|-------|
| | | | | r | I | (| ,/ |

| Сгор | Existing crop production | Existing optimal crop production plan | Suggested optimal crop product plans | | | |
|-------------|--------------------------------|---|--------------------------------------|---------|---------|--|
| | plan | • | | | | |
| | | | Ι | II | III | |
| Paddy | 1074.26 | 1078.02 | 966.83 | 963.12 | 918.41 | |
| Pearlmillet | 602.28 | 509.63 | 496.35 | 498.21 | 498.04 | |
| Maize | 18.24 | 107.13 | 59.86 | - | - | |
| Wheat | 2286.19 | 2171.30 | 2002.57 | 1943.27 | 1869.49 | |
| Barley | 38.34 | - | - | - | - | |
| Chickpea | 294.18 | 294.18 | 329.87 | 343.42 | 365.41 | |
| Rapeseed | 452.08 | 615.18 | 630.21 | 645.03 | 654.08 | |
| Cotton | 560.38 | 560.38 | 514.71 | 500.33 | 498.37 | |
| Sugarcane | 135.46 | 135.46 | 135.46 | 135.46 | 135.46 | |
| Potato | 14.08 | 14.08 | 61.08 | 81.37 | 98.06 | |
| Red gram | | | 72.23 | 92.07 | 110.31 | |
| Green gram | - | - | 62.24 | 86.78 | 103.87 | |
| Soybean | | - | 82.94 | 112.56 | 126.16 | |
| Lentil | - | - | 58.14 | 71.78 | 97.83 | |



Saving benefits accrued from crops

The accrued saving benefits tread a varied path. All the optimal plans showed the saving in water requirement. The fertilizer saving got increased and reached to peak in optimal crop production plan-III. Similarly, the nitrogen and phosphorous savings exhibited the trend. The pesticides saving pattern exposed the negative trend in all the optimal crop production plans with little bit difference. As result, total saving benefits accrued in the existing optimal crop plan turned out to be a negative sum of Rs.68805.53 thousands (Table 9). Benefits in subsequent optimal crop production plans show the increasing trend with highest in the suggested optimal crop plan-III. The reduced use of critical farm inputs viz; water and agrochemicals will open a new window for economic, social and ecological considerations. Thus, in this way, it will add to economic benefits with reduced use of purchased inputs, curtail the harmful and hazardous effects and build up soil structure and texture.

| Сгор | Existing crop production plan | Existing optimal crop production plan | Suggested optimal crop production pla | | |
|------------------------------|--|---|---------------------------------------|------------|------------|
| | | | Ι | II | III |
| Water use (metre hectare) | 2857.92 | 2855.68 | 2694.39 | 2670.78 | 2612.71 |
| Fertilizers (kg) | 1206851.69 | 1197415.81 | 1131430.39 | 1108790.24 | 1087700.98 |
| Nitrogen (kg) | 671504.78 | 666720.30 | 624296.35 | 609572.35 | 596503.85 |
| Phosphorous (kg) | 296444.51 | 294277.71 | 288387.84 | 286677.70 | 284214.93 |
| Potash (kg) | 238902.40 | 236417.80 | 218746.20 | 212540.19 | 206982.20 |
| Pesticides (kg/litre) | 3217.68 | 3343.52 | 3338.36 | 3336.14 | 3342.81 |

| Table 8: | Existing | and | suggested | crop | plans | (000.ha.) |) |
|----------|----------|-----|-----------|------|-------|------------|---|
| Iupic 0. | LAISting | ana | buggebieu | crop | Plans | (000,114.) | , |

Pattern of returns from crops

With changes in acreages under different optimal crop plans, the input use pattern as well as returns under went a change. The emerged out pattern of returns has been presented in table 10 reveals that gross returns from the crop production activity in the subsequent suggested optimal crop production plans decreased marginally. The saving benefits accrued over the existing crop plan turned out to be a positive. There after, it showed an upward trend through successive optimal plans.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

This resulted positive changes in saving benefits in successive optimal plans. The least reduction of 0.16 percent was observed in the optimal crop plan -II considering gross returns plus saving benefits. The findings further reveal that with an initial minor set back, it picked up in the successive optimal plans. Moreover, the changed pattern of returns will have to be viewed not only from economic consideration but also taken into consideration viz; said and unsaid quantification, qualitativeness on food front, ecological dimensions and sustainable growth parameters. The results of the study reveal that area under forests does not indicate any appreciable increase over the years. The cropping pattern exhibited the acreage concentration of resource exhaustive and less risky crops like cotton, wheat, sugarcane and paddy and large share of irrigation water were used amongst these crops. Increased consumption of nitrogenous fertilizers and pesticides, continuation of same cropping pattern over the time period resulted into accentuating the area under problematic soils, depletion of underground water, infestation of weeds, insect-pests and diseases. The optimal sustainable production plans showed increase in gross returns as well as accrued benefits through saving the water and agro-chemicals. The optimal production plans in corporation the crop enterprises like green gram, black gram, soybean, groundnut etc not only improve the soil health but also reduction in use of natural resources and agro-chemicals. The optimal crop production plans further make sure to accommodate the economic, ecological and social aspects paving the path for sustainable development in agriculture.

| Сгор | Existing optimal crop production plan | Suggested optimal crop production plans | | | | | |
|-------------|---|---|------------|------------|--|--|--|
| | | Ι | II | III | | | |
| Water use | 4412.80 | 322154.10 | 368665.80 | 483063.70 | | | |
| Fertilizers | 91835.85 | 678827.03 | 877789.31 | 1069169.65 | | | |
| Nitrogen | 45739.63 | 451312.59 | 592074.03 | 717008.89 | | | |
| Phosphorous | 33325.38 | 123911.58 | 150213.53 | 188090.94 | | | |
| Potash | 12770.84 | 103602.86 | 135501.75 | 164069.82 | | | |
| Pesticides | -27443.12 | -26308.24 | -25024.28 | -27278.34 | | | |
| Total | 68805.53 | 974672.89 | 1221430.83 | 1524955.01 | | | |

| | Table 9 : | Saving benefit | accrued from | different crop | plans (000,Rs.) |
|--|-----------|----------------|--------------|----------------|------------------------|
|--|-----------|----------------|--------------|----------------|------------------------|



| Сгор | Existing crop production plan | Existing optimal crop production plan | Suggested optimal crop production plans | | |
|--|--|--|---|-------------------------|-------------------------|
| | | | Ι | II | III |
| Gross returns(crops) | 105311422.80 | 104948059.90 (99.65) | 104323393.00 (99.06) | 103710367.60 (98.47) | 103621184.70 (98.39) |
| Saving benefits (Water+ fertilizers +pesticides) | - | 68805.53 | 974672.89 | 1221430.83 | 1524955.01 |
| Gross return+ saving benefits | 105311422.80 (100.00) | 105016865.43 (99.72) | 104298065.89 (99.03) | 104931798.43 (99.63) | 105146139.71 (99.84) |

Table 10: Changing pattern of crop returns (000,Rs.)

Note : Figures in parentheses indicate change over the existing plan

CONCLUSIONS

The analysis concludes that that area under forests does not show any appreciable increase over the years. However, intensity of cropping has increased. The cropping pattern vividly exhibits the acreage concentration of the resource exhaustive crops like paddy, wheat, cotton and sugarcane. Most of the irrigation water was shared amongst these crops. Fertilizer consumption pattern discerns the increasing trend at disproportionate rate over the years. Consumption of nitrogenous fertilizers increased at much faster rate than that of phosphatic and potashic fertilizers. Continuing adoption of the same cropping pattern has resulted into accentuating the area under problematic soils and distributing hydrological balance. How ever the input use pattern of water and agro- chemicals exhibits the reducing trend under successive optimal crop production plans. The benefits brought about savings in water and agro-chemicals are likely to open new window for economic, social and ecological frontiers. In order to respond dynamically to current challenges, policies like water pricing, water shed management, diversification, change crop rotations and crop-mix to make progress towards profitable and environmentally sustainable production systems. Agriculture need to be based on judicious use of renewable energy. The technologies of crop production are needed to reduce gradually the use of chemical fertilizers, pesticides and heavy farm machines without effecting crop productivity. Emphasis on bio-fertilizers, bio pesticides conservation farming and integrated water shed management etc are precepts that assure sustainable food supplies



REFERENCES

Allen, P.1993. Connecting the social and the ecological concerns in sustainable agriculture, in food for the future. Patricia Allen, Ed., New York, John Wiley and Sons, pp1-16.

Annonymous, 2002.Various issues of Statistical Abstract of Haryana, Department of Economic and Statistical Organisation, Government of Haryana.

Annonymous, 2003. Krishi Diary. Department of Agriculture, Government of Haryana.

Goerge, P.S.1994. Management of renewable natural resources/sustainability of agriculture. Indian Journal of Agricultural Economics, 49 (1):41-46.

Jones, M.1991. Agricultural Sustainability Research at ICARDA. International Centre for Agricultural Research in Dry Areas, Aleppo, Syria, Pp:20

Mendoza, C.T.1993. Incorporating sustainability objectives in National Food Production and Agricultural Extension Programme in Philippines. Farm Management Notes, 17:32-43.

Joshi;P.K. and Tyagi ,N.K. 1994.Sustainablits of existing farming systems in Punjab and Haryana. Some issues on ground water use. Indian Journal of Agricultural Economics, 46(3): 412-421.

Saleth,R.M. 1993. Agricultural sustainability status of the agro-climatic sub-zone of India: Empirical illustration of an indexing approach. Indian Journal of Agricultural Economics, 48(3): 543-550.

Chora, K.1990. Agricultural Development in Punjab: Issues in resource use and sustainability, New Delhi, India, Vikas Publishing House. Pp.154.

Zeller, Manfred.2003. Economic and social issues related to sustainable agriculture. Journal of International Agriculture.42 (1): 1-3.

Kurosaki, Takashi, 2003. Specialization and Diversification in Agricultural Transformation: the case of west Punjab, 1903-92. Amercian Journal of Agricultural Economics. 85(2): 372-386.



STEERING TOWARDS A DYNAMIC EQUILIBRIUM OF DEVELOPMENT AND ENVIRONMENTAL SUSTAINABILITY: A DEVELOPING NATION'S PERSPECTIVE

P.K. GOGOI, D.K. CHAKRABORTY

Deprtment of Chemistry, Dibrugarh University, Dibrugarh,,Assam, India Deprtment of Economics, Dibrugarh University, Dibrugarh,, Assam, India dr_pradip@yahoo.com,dkchakraborty@rediffmail.com

Development is related to enhancement of the quality of human life in terms of increase in economic growth, infrastructure, industrial output, per capita income, adequate social security and polity, which is achieved by exploitation of nature or sometimes one section of people for the benefit of another section. Just as a gold medal has another face, development has also a dark hidden face. It is said that 'development has some visible price tag but has huge hidden cost in terms of environmental damage' which has cascading effect. The words 'Development' and 'environmental sustainability' are becoming cliches with poor understanding of their implications. There is no denying of the fact that environmental degradation is a direct outgrowth of development, both planned and unplanned, started since industrial revolution in England. John Stuart Mill said 'the very aim and object of any action is to alter and improve nature'. Hence, development being an economic action causes environmental damage, the very process which bring fruitation to some section of the society. Every productive process has two major goals, viz., maximize production and minimize waste. By dumping waste products in rivers and lakes or by burning them, we may minimize the cost of their disposal, but this results environmental degradation. Many poor and socially excluded people in the LDCs maintain an unadulterated relation to nature and consider individual's sustenance as an integral part of an organic community. Some development pundits (Stiglitz 2003), however, maintain that poverty can lead to environmental degradation and environmental degradation can contribute to poverty. A circular logic indeed! In the developing countries, the poor share a marginal gain from the development initiatives and at times the groan of the poor and its cumulative effects shadows the overall benefits from development. Development, therefore, does not mean the freedom to exclude others from a genuine relation to nature and fruitation of life's possibilities; but rather the freedom of all to share in life's development as part of organic community. But the development efforts in a globalized economic system have created islands of exclusion and compartmentalization of social groups and marginalization of their potential. This globalized market oriented outlook has also fragmented the delicate ecological harmony for immediate benefit of the exclusive few. This aspect has been brilliantly focused by Giovanna Ricoveri as "People are also part of nature, and the exploitation of nature is therefore also the exploitation of some people by other people. Environmental degradation is also the degradation of human relationships."



Already there is a mad race for enhanced growth among all the countries including the LDCs, without taking into account the other aspects in a holistic way. Everybody wants immediate share of the growth and it seems they want to live always in the 'present'. Empirical generalizations, moreover, has indicated that environmental impact has direct relationship with per capita income and population in the form of (Callan *et.al.* 1996):

| Environmental = | Income Per | Х | Environmental | Impact | Х | Population |
|-----------------|------------|---|-------------------|--------|---|------------|
| Impact | Capita | | Per Unit of Incom | me | | |

As the LDCs are aspiring for the growth in per capita income which is a prerequisite for development and eradication of absolute poverty. Hence, environmental impacts in these countries can be minimized by checking population growth and environmental impact per unit of income. Ironically, most of the LDCs have failed to get any breakthrough in population control and hence the only option left out is the reduction in the 'environmental impact per unit of income generated', reduction of which demands sustainable development of agriculture, minimization of industrial pollution, minimization of urbanization induced pollution, restoration of non-renewable resources, maintaining required forest cover, etc. environmental degradation disrupts the developmental process in the LDCs by imposing heavy cost on expenses on health as well as reduction on the productivity and human resources. In the LDCs the people in the lower strata of the society are worst hit. Hence though due to such unsustained and unplanned development leads to immediate rise in gross national product (GNP) of a country but in the absence of environmental considerations in the calculations of GNP, it will not be a determining factor in the long run. The sustained net national product (SNNP) for the LDCs, though difficult to calculate, would be,

 $SNNP = GNP - \mathbf{O}_c + D_e + E_m + E_a + P_l + HE_p$

where, D_c = Depreciation of the capital assets, D_e = Depreciation of the natural capital assets, E_m = Expenditure required to partially restore environmental damage, E_a = expenditure required to avert environmental damage, P_l = Expenditure required to compensate the adverse affects of pollution, HE_p = Expenditure required for restoration of health affected by pollution.

Besides, exponential growth of population in the LDCs, the worst perpetrator of disturbed environmental balance is the unplanned economic development. High rural-urban migration makes it difficult to provide access to minimum facilities needed for maintaining a good quality of life. Dependence on biomass fuel leads to deforestation. Depletion of ground water, and unsustained agriculture in these countries are adding fuel to the fire.



Marx, almost in similar response to something of the sort, magnificently warned that: "Nature is man's inorganic body, that is to say nature in so far as it is not the human body. Man lives from nature i.e., nature is his body and he must maintain a continuing dialogue with it if he is not to die. We are all familiar with the pitfalls of thinking of phenomena of any kind in isolation from the 'systems', which sustain them and are sustained by them".

The less developed countries (LDCs) of the present day world are facing a disturbed and unsynchronized relationship of regional development co-ordinates with global development network co-ordinate. This has two implications. First, the yardstick of measuring development need to be looked from different perspectives for developed and LDCs. Second, this may lead to misallocation of resources in the LDCs as well as dumping of surplus products in these countries. This makes the achievement of the dynamic equilibrium between development and environmental sustainability difficult. The improper use and misallocation of resources are generally associated with serious all cascading environmental effects in the LDCs. Both planned and unplanned developmental efforts in such economies have got its threshold tolerance limit of environment to absorb the damage by its assimilative capacity. In such a mad race of development, instead of growth statistics, the LDCs should look into a Grand National Happiness Index (GNHI) in framing the regional development co-ordinates in the form of

GNHI = (SNNP + Q + P)/k

Q is a qualitative and relative term indicating the quality of life in terms of education, general aspirations, health care, social security and employability. P is a term derived from social engineering encompassing polity, social norms, ethics, laws and spirit of democracy and k is the term indicating population. To achieve a higher GNHI, k must be kept to a minimum by persuasion via mass education and awareness or by enlarging the terms in the numerator, which is a bit difficult process. Beyond a threshold limit of k, however, GNHI cannot be increased by mere increase of the numerator.

The issue of development is based, in all forms and levels, on attaining equilibrium of development and environmental sustainability over time. The experience of developing countries points that growth maximization has only led to greater polarization into 'dual' societies because the benefits of growth have been skewed in favour of the marginal elites compared to the poverty wounded majorities (Reddy 1985).

Nevertheless, planned development is welcome with a minimal damage to the ecosystem along with the maximum benefit to the poor people. Much of the environmental damage in the urban areas and consequences on SNNP can be made avoidable. For this, the whole matrix of the problem and the ways through which these interacts with the society need to be found out.



The Case of India

After several years of economic reforms, Indian economy is poised at the threshold of a paradigm shift in development perspective. Indian economy is now poised for an accelerating mode. Though we could achieve 8.1 per cent growth in the GDP, but have failed to provide adequate employment opportunities, tackling poverty and maintaining environmental sustainability.

One reason for such a contrasting scene in the economy could be the poor performance in the agricultural front. Although the agricultural sector is the backbone of Indian economy it is starved of capital, innovative methods and guarantee against natural vagary. The profit from agriculture has gradually declined. The share of agriculture in the total gross capital formation has declined from 21 percent in 1951-52 to 15.4 percent in 1980-81 and further to 8 percent in 1999-00. This, in turn, has dampened the initiative to develop the agro based rural industries. Hence, the fruits of '8.1 per cent growth' are likely to be transitory as it fails to address the burning agricultural issues. Hence it shall not sustain. Deterioration of soil fertility and depletion of country's water resources has not received adequate attention and appropriate ameliorative measures are yet to be mooted. Nevertheless, the better side of the story is that the National Planning Commission is optimistic of achieving the poverty reduction target of 5 percent at the end of the stipulated period. But the latest round of survey conducted by the National Sample Survey Organization (NSSO) on 'household consumer expenditure and employment-unemployment situation' stated that at the all India level, three rural households per thousand and one urban household per thousand do not get enough to eat in any month of the year. The all India poverty ratio, however, went down, only marginally, from 26.1 percent in 1999-2000 to 24.9 percent in 2003. While the rural poverty went down from 27.1 percent to 25.2 percent, urban poverty went up from 23.6 percent to 23.95 percent. However, the two sets of data are not that comparable because the figures for 1999-2000 are based on a large sample round whereas the figures for 2003 are small sample rounds. But still it reflects the dimension and the direction of the burning problem faced by the country.

Table 1. Population below the poverty line (As per the Expert Group Methodology)Population in Millions.

| Poverty Ratio (%) | | | | | | | |
|-------------------|-------|------|------|------|------|------|--|
| 1 | Rural | 56.4 | 45.7 | 39.1 | 37.3 | 27.1 | |
| 2 | Urban | 49.0 | 40.8 | 38.2 | 32.4 | 23.6 | |
| 3 | Total | 54.9 | 44.5 | 38.9 | 36.0 | 26.1 | |

Sources: Planning Commission, Ninth Five Year Plan 1997-2002, Volume-1, "Number and Percentage of Population Below Poverty Line by States", The Hindu, 26.2.01

| Table 2. I Toject | | overty Kattos (in | percentage) | |
|-------------------|---------|-------------------|-------------|---------|
| Region | 1996-97 | 2001-02 | 2006-07 | 2011-12 |
| Rural | 30.55 | 18.61 | 9.64 | 4.31 |
| Urban | 25.58 | 16.46 | 9.28 | 4.49 |
| Total | 29.18 | 17.98 | 9.53 | 4.37 |

 Table 2. Projection of National Poverty Ratios (in percentage)

Source: Planning Commission, Ninth Five Year Plan 1997-2002, Vol. 1.



Projection of National poverty ratios in percentage are given in Table 2. It is seen that projected national poverty ratio is lees that 5 percent in the year 2011-12 which may be considered as satisfactory for a populous developing country like India.

| States | 1983 | | 1993-94 | | 1999-00 | |
|-------------------|-------|-------|---------|-------|---------|-------|
| | Food | Non- | Food | Non- | Food | Non- |
| | | Food | | Food | | Food |
| Andhra Pradesh | 54.57 | 45.43 | 53.84 | 46.16 | 47.44 | 52.56 |
| Arunachal Pradesh | - | - | 60.82 | 39.18 | 57.65 | 42.35 |
| Assam | 63.77 | 36.23 | 59.68 | 40.32 | 55.38 | 44.62 |
| Bihar | 66.14 | 33.86 | 62.92 | 37.08 | 57.24 | 42.76 |
| Goa | 59.18 | 40.82 | 59.09 | 40.91 | 51.33 | 48.67 |
| Gujarat | 61.75 | 38.25 | 58.41 | 41.59 | 49.58 | 50.42 |
| Haryana | 57.80 | 42.20 | 53.87 | 46.13 | 45.87 | 54.13 |
| Himachal Pradesh | 54.00 | 46.00 | 42.45 | 57.55 | 45.34 | 54.66 |
| Jammu & Kashmir | 64.00 | 36.00 | 56.41 | 43.59 | 55.51 | 44.49 |
| Karnataka | 57.88 | 42.12 | 55.71 | 44.29 | 46.32 | 53.68 |
| Kerala | 58.96 | 41.04 | 53.93 | 46.07 | 49.04 | 50.96 |
| Madhya Pradesh | 58.99 | 41.01 | 52.85 | 47.15 | 47.60 | 52.40 |
| Maharashtra | 57.53 | 42.47 | 53.02 | 46.98 | 45.31 | 54.69 |
| Manipur | 71.56 | 28.44 | 63.82 | 36.18 | 56.40 | 43.60 |
| Meghalaya | - | - | 56.38 | 43.62 | 47.02 | 52.98 |
| Mizoram | 58.90 | 41.10 | 54.14 | 45.86 | 52.04 | 47.96 |
| Nagaland | 64.64 | 35.36 | 58.85 | 41.15 | 47.64 | 52.36 |
| Orissa | 65.13 | 34.87 | 57.79 | 42.21 | 56.95 | 43.05 |
| Punjab | 55.92 | 44.08 | 53.03 | 46.97 | 47.12 | 52.88 |
| Rajasthan | 57.58 | 42.42 | 56.65 | 43.35 | 50.85 | 49.15 |
| Sikkim | 55.17 | 44.83 | 55.18 | 44.82 | 47.53 | 52.47 |
| Tamil Nadu | 58.40 | 41.60 | 54.60 | 45.40 | 45.61 | 54.39 |
| Tripura | - | - | 56.96 | 43.04 | 56.18 | 43.82 |
| Uttar Pradesh | 59.13 | 40.87 | 55.99 | 44.01 | 50.49 | 49.51 |
| West Bengal | 60.90 | 39.10 | 55.93 | 44.07 | 52.28 | 47.72 |
| Andaman & | - | - | 43.78 | 56.22 | 51.26 | 48.74 |
| Nicobar | | | | | | |
| Chandigarh | - | - | 35.79 | 64.21 | 38.82 | 61.18 |
| Dadra & Nagar | - | - | 62.68 | 37.32 | 47.72 | 52.28 |
| Haveli | | | | | | |
| Daman & Diu | 59.18 | 40.82 | 62.79 | 37.21 | 53.70 | 46.30 |
| Delhi | 54.00 | 46.00 | 48.58 | 51.42 | 41.04 | 58.96 |
| Lakshadweep | | - | 67.14 | 32.86 | 60.03 | 39.97 |
| Pondicherry | 56.09 | 43.91 | 57.71 | 42.29 | 51.00 | 49.00 |
| All India | 58.69 | 41.31 | 54.65 | 45.35 | 48.06 | 51.94 |

Table 3: composition of Urban Per Capita Consumption Expenditure (in percentage)



Source: *National Human Development Report 2001*, Planning Commission, Govt. of India, But the fall in the poverty ratio is to be seen in the perspective of uncontained developmental initiatives. During the past two decades the composition of per capita consumption expenditure has been changed dramatically particularly in urban India (table 3). Such significant change within a short span of time indicate pressure on environment as the nonfood segment (both production and consumption) is associated with diseconomies in the form of environmental degradation.

Indicators of changes in forest cover:

For sustainable economic development, the balance between economic activities and biodiversity need to be maintained. The forest cover, as a part of the greater symbiosis, should not be left to shrink or vanish due to the so called developmental initiatives. Loss of forest cover not only sap the economic resources of a country but also it is detrimental to the agricultural and human sustenance, as forest controls the moisture level for seedling of rain and controls global temperature. Economic indicators of loss of forest covers are many and varied, viz., urban non-food consumption expenditure, urbanization rate, number of persons below poverty line, per capita net state domestic product are some of the main indicators. In this section, a cross sectional analysis is done to identify the indicators that have bearing in the position of poverty in India. The correlation coefficient matrices has been calculated by taking state level data for 28 states and union territories of India with reference to two periods of time, viz. 1993 and 1999. It is tried to analyze the effects of (1) urban non-food consumption expenditure (X_1) , (2) urbanization rate (X_2) , (3) number of persons below poverty line (X_3) , (4) per capita net state domestic product (X_4) on forest cover (X_5) for the year 1993 and 1999. Table 4 and Table 5 show the correlation coefficient matrices for 1991 and 1999 respectively

| Variables | X_1 | X_2 | X ₃ | X_4 | X ₅ |
|----------------|--------|--------|----------------|--------|----------------|
| X1 | 1.000 | | | | |
| X ₂ | 0.255 | 1.000 | | | |
| X ₃ | -0.171 | -0.122 | 1.000 | | |
| X_4 | 0.320 | 0.681* | -0.329 | 1.000 | |
| X ₅ | -0.091 | -0.195 | 0.391** | -0.288 | 1.000 |

Table 4: Correlation matrix (1991)

* significant at 1 per cent level of significance. ** significant at 5 per cent level of significance

| 1401C 5. CO | | (1 <i>)</i>)) | | | |
|----------------|--------|----------------|----------------|--------|-------|
| Variables | X_1 | X_2 | X ₃ | X_4 | X_5 |
| X_1 | 1.000 | | | | |
| X_2 | 0.494* | 1.000 | | | |
| X ₃ | -0.111 | -0.183 | 1.000 | | |
| X_4 | 0.530* | 0.762* | -0.327 | 1.000 | |
| X ₅ | -0.116 | -0.174 | 0.451** | -0.277 | 1.000 |

Table 5: Correlation matrix (1999)

* significant at 1 per cent level of significance. ** significant at 5 per cent level of



significance

The correlation matrix-1991 shows that though there are negative correlation between X_1 , X_2 , X_4 with X_5 , but they are not significant. On the other hand correlation between population below poverty line (X₃) with forest cover (X₅) is positive and significant at 5% level of significance. Similar findings are noted in the correlation matrix-1999. The scatter plots between X_3 and X_5 for 1993 and 1999 are given below:

Scatter Plots (1993)



Scatter Plots (1999)



The scatter plots reveal weak but positive correlation between the variables.



Energy Use Pattern and Sustainable Development in India:

For achieving a sustainable GNHI equilibrium in a multi-variate force field, other important factors like containing carbon emission to a threshold limit and judicious use of energy should be prioritized. Carbondioxide is not only a trivial gas but also it controls the thermal balance of the earth and a serious pollutant as well. Carbondioxide is not only a gas that affects heat flow to and from the atmosphere of the earth, but also a serious pollutant. "With the present value of the concentration of carbondioxide in the atmosphere at 373 ppm, humans and other mammals are already in unknown territory with regard to physiological effects of an atmosphere with a much higher concentration of carbondioxide" (Robertson 2006). The concentration of carbondioxide beyond a threshold limit has severe adverse affects on health of the mass population.

The rapidly growing population in India is posing serious threat to the ecosystem. Deforestation, soil erosion, land degradation, water and air pollution continue to worsen and are indirectly hindering the achievement of a higher GNHI over time. "*At the same time India's energy consumption has increased manifold in the recent years. Total energy consumption has increased manifold in the recent years. Total energy consumption has increased from 4.16 quadrillion Btu in 1980 to 12.8 quadrillion Btu in 2001*" (www.india%20environmental%20issues.htm). This 208 per cent increase over 20 years period is mainly due to the pressure of population, industrialization and rapid urbanization in the country. Coal accounts for 50 per cent of India's total energy consumption. Contrary to this, geothermal, wind and solar energy exploitation levels in the country is meager. Consumption of energy is associated with carbon emissions and greenhouse gasses. Between 1990 and 2001, India's carbon emissions increased by 61 per cent. If such trend persists, then it will be difficult to attain a high GNHI in a multi-dimensional pressure field active in the framework of GNHI. Carbon intensity, i.e., carbon emissions per unit of GDP is also high in India in comparison to her neighbours.

In the absence of carbon intensity budgeting such problems are likely to persist. If coal is substituted by other sources particularly non-conventional ones, then the carbon emissions can be reduced. Though India has good administrative set-up for non-conventional energy as well as vast potential for the same, still the country has a long way to go in this sector. The better side of the story is that, of late, India could make significant dent in the field of environmental protection and sustenance.

The Strategies

Protection, conservation and optimum/judicious use of natural resources were imbibed in ancient Indian culture. However, with population explosion, underdevelopment and with growing urbanization, industrialization and unplanned developmental work and poverty – the environment is highly constrained today in the form of soil erosion, forest covert depletion, air, water and noise pollution, etc. Although there are enough institutional provisions for environmental protection and conservation since the days of the British rule in India and implementing agencies like the State Pollution Boards, but these are not proliferated to the grassroot level in letter and spirit. In India, there is wide division of powers between the executive, legislative and the judiciary.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

The laws are complicated for easy comprehension and there exists loopholes for escape through misinterpretation and litigation and delay in implementation. The legal procedure takes long time and end up with very small penalty. Environmental awareness among the masses is not adequate. Administrative supports in the form of good laboratories and procedural guidelines are also not very strong. Besides, flat fines for defaulters, there should be incentives to lower the damage below prescribed levels. While taking the developmental projects considerations be made to get *design for environment*, with provision for environmental audit, technology assessment and environmental damage costing.

The over exploitation of natural resources for short time developmental gain will not be conducive for overall good. Some resources, like water, which is sustainer of the life process, should be managed very judiciously remembering the fact that, of all the total water only approximately one percent is suitable for human use. To conserve other precious energy resources like oil, coal, etc. there should be patronization of innovative public transportation, which will also reduce pollution to some extent as well as containing the oil pool deficit to certain limit. More incentives should be given for biomass production for use as fuel and for reduction of green house gasses. New research and development works on non-conventional energy sources and energy use audit should be materialized. Another important area which needs attention, is the sustainable agricultural practices by use of bio-pesticides and bio-fertilizers and developing indigenous HYV seeds and optimum use of water resources, including rain water harvesting.

Examples of traditional norms of exploitation and conservation of nature in tribal society (Box 1 & 2):

Box 1

....The main issue is to save the remaining natural forest. Artificial and planted forests, however big, can never be their substitute. Therefore, all have to join their efforts in safeguarding the threatened and endangered natural forests. If saved and improved, they will not only regulate the present day climate but will also ensure the very survival of the next generation.

Source: D Souza Alphonsus (2005), *Traditional Systems of Forest Conservation in North East India: The Angami Tribe of Nagaland*, NESRC, Guwahati, p 119.



Box 2

....The chief forest produce are timber and firewood. The owner of a piece of forest can cut trees for timber or firewood or employ others to do so. He can get as much timber or firewood as he needs. If he does have the desired type of timber in his personal property, he can get it from the common clan or village elders. Though a person can get as much timber or firewood from his own forest as he needs, he cannot sell it. The principle that one can get timber and firewood only for one's needs but not for sale probably reflects the situation, as it existed in former times. In the past, no one sold timber or firewood simply because there were no buyers in the village, and the practice of selling it to outsiders did not exist. This past situation has been gradually turned into a norm more by observance than through conscious enactment.

Medicinal plants, edible fruits and leaves, tubers and roots for human consumption and to feed the pigs and other animals, can be collected by anyone from anywhere. But the general principle is that they should not be wasted. Any destructive method invites censure or even punishment in the form of fines.

An interesting feature in the Angami area is that a tree is never cut and uprooted completely. Two or three feet of the tree trunk are usually left. Often such a trunk grows branches and the growth of these branches is fast because of the strong trunk with its deep roots. This practice is probably an adaptation of pollarding Alder trees, which symbolize their sustainable forest management.

Source: D Souza Alphonsus (2005), *Traditional Systems of Forest Conservation in North East India: The Angami Tribe of Nagaland*, NESRC, Guwahati.

Ground water is one of the major sources for water supply in many parts of the country. In the cities too ground water contributes to substantial quantity of supply. Especially in new development areas ground water is largely being utilized as a drinking water source, mainly because of the insufficiency of the river water share. Too much dependence on groundwater and its over exploitation has some serious health hazards in the form of arsenic and fluoride contamination. Ground water collects in the aquifers over thousands of years through infiltration and ground water flow recharge. A particular amount of ground water means withdrawal of ground water at a rate at which it is replenished through recharge. Faster withdrawal rates would lead to fall in water table and finally depletion of ground water. The ground water recharge areas need to be identified so that maximum recharge can be achieved. The recharge areas need to be conserved and preserved for the sustainable management of ground water and to maintain the potential of the ground water in the cities.



Areas where the ponds already exist and its surroundings can be used as water recharge area. A synergy should be made between the traditional knowledge systems and the modern scientific knowledge particularly in the health care sector is needed so that the access to health care can be made available to all sections of the society. The above measures will not bring the desired results if proper strategies are not devised to cheek the growth of population. To reap the benefits of all these well-drawn strategies in a holistic form, mass education and awareness stands as the prime criteria. Affirmative action is needed towards this end.

REFERENCES:

- 1. Bardhan Pranab (2006): "Does Globalization Help or Hurt the World's Poor?", *Scientific American India*, Vol. 1, Number 11, April, pp 68-75.
- 2. Callan S J & Thomas J M (1996): *Environmental Economics & Management*, Irwin, Chicago, pp 646-647.
- 3. D Souza Alphonsus (2005): *Traditional Systems of Forest Conservation in North East India: The Angami Tribe of Nagaland*, NESRC, Guwahati, p 119.
- 4. Foster John Bellamy (2003): *Ecology Against Capitalism*, Cornerstone Publications, Kharagpur, pp 46-48.
- 5. Harvey David (1996): Justice, Nature and the Geography of Difference, Oxford: Blackwell.
- 6. Kumar B Mohan (2006): "Woodfuel resources in India", *Proceedings of the National Academy of Sciences*, India, Vol. 76, B, Part I, pp 1-9.
- 7. Mill John Stuart (1998) edition consulted: *Three Essays on Religion* (1874), Prometheus Books, London.
- 8. Neil Middleton & Phil O'Keefe (2001): *Redefining Sustainable Development*, Pluto Press, London.
- 9. Prasad Rajendra (2006): "Towards sustainable agriculture in India", *National Academy Science Letters*, Vol. 29, No. 1 & 2, pp 41-44.
- 10. Singh Sunil Kumar (2006): "Spatial variability in erosion in the Brahmaputra basin: causes and impacts", *Current Science*, Vol. 90, No. 9, pp 1272-1276.
- 11. State of Forest Report (2001), Government of India, pp 2, 19-20.
- 12. Stiglitz Joseph (2003): *Globalization and its Discontents*, Penguin Books, New Delhi, pp 216-224.
- 13. Todaro Michael P & Smith Stephen C (2003): *Economic Development*, Pearson Education, New Delhi, pp 465-467.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



LIFE CYCLE ASSESSMENT (LCA) METHODODOLOGY IN THE BUILDING SECTOR

Arzuhan Burcu GÜLTEKİN*, Gülser ÇELEBİ

Faculty of Technical Education, Gazi University, Turkey Faculty of Engineering and Architecture, Gazi University, Turkey arzuhanburcu@yahoo.com,gulser@gazi.edu.tr

Environment consciousness has developed as the environmental pollution increased in local and global scale. In this context, all sectors have begun to assess the environmental impacts of their products by some methods. One of these methods is Life Cycle Assessment (LCA) which has been developed rapidly in the past decade. LCA method is to a large extent used for environmental assessments of short lived industrial products either to compare different alternatives or to propose improvements. As the LCA method has been adopted by the building sector, a number of building specific problems are faced. In order to support the understanding of these methodological problems and to solve them, LCA is defined in methodological framework, and a systematic procedure is proposed in this paper. Within this framework, the building specific considerations are examined, and the further research needs are discussed as a conclusion.

Keywords: Life Cycle Assessment, Building Sector, Building Products, Environmental Impacts.

INTRODUCTION

One of the key sectors to achieve a sustainable society is the building sector. The building sector is responsible for approximately 40% of the total energy use, and uses approximately 7,5 billion ton of building materials per year. [1, 2] Buildings are part of the infrastructure; meanwhile they use and require other parts of infrastructure as well as they require land, water, raw materials and energy during their production, utilisation, maintenance and demolition. Thereby buildings affect the natural environment directly and indirectly via the use of products and services during their long life cycles. [3] In this case it is essential to assess the environmental impacts of buildings. However, this assessment is a complex and difficult task because of the long lives of building products. When assessing the environmental impacts of building products, an improvement in one area of the product's life cycle can lead to an unwanted impact in another area. [4] In this context, a systematic method is required to assess the environmental impacts through the whole life cycle. One of the methods used for this purpose is Life Cycle Assessment (LCA). LCA is a powerful method to compare products concerning their environmental performance. However, several obstacles occur when LCA method is applied to building products. Building products have long service lives, and many actors involved during their life cycles which makes it difficult to predict what actually happens during their whole life cycles. [4] In order to support the understanding of these methodological problems in the building sector, Life Cycle Assessment (LCA) should be described in methodological framework first.



LIFE CYCLE ASSESSMENT (LCA) METHODOLGY

The heightened awareness of the importance of environmental protection, and the possible environmental impacts associated with products manufactured and consumed has increased the interest in the development of methods to better comprehend and reduce these impacts. [5] One of the methods developed for this purpose is Life Cycle Assessment (LCA). According to the definitions in the ISO 14040 series [5-11) LCA is a technique for assessing the environmental aspects and potential impacts associated with a product, by

- compiling an inventory of relevant inputs and outputs of a product system;
- evaluating the potential environmental impacts associated with inputs and outputs;

• interpreting the results of the inventory analysis and impact assessment phases in relation to the objectives of the study.

Furthermore, LCA is a method or tool to assess the potential environmental impacts of a product or service in a quantitative way. [4] It is hence one of the available methodologies for assessing the environmental impacts related to product systems. [3] LCA studies the environmental aspects and potential impacts throughout a product's life cycle from raw material acquisition through production, use and disposal. [5] "Life cycle" incorporates an expansion both temporal and spatial compared to the product or service. The temporal expansion means that the product or service analysed is followed "from cradle to grave". The cradle can normally be the extraction of raw material and fuel to produce the analysed product or system. The cradle can be defined as the place or moment when the raw materials or resources are taken from nature into the technical system. In the same way, the grave can be defined as the place and time when the products or used resources are returned to nature. The spatial expansion means that also transports, production facilities, auxiliary materials, supplying systems, maintenance, waste treatment and similar activities necessary for the whole life cycle have to be included to the analysis. [4] The general categories of environmental impacts needing consideration include resource use, human health and ecological consequences [5] associated with the input and output flows of the analysed system. [3]

The object of an LCA is consequently, not only the product itself, but the product system [production facilities and supporting systems) requested to produce and deliver the product, use and maintain the product, deconstruct, recycle or dispose off the product. [3] According to international standard ISO 14040 LCA can assist in [5]:

 identifying opportunities to improve the environmental aspects of products at various points in their life cycle;

• decision-making in industry, governmental or non-governmental organisations (e.g. strategic planning, priority-setting, product or process design or redesign);

 selection of relevant indicators of environmental performance, including measurement techniques;

• marketing (e.g. an environmental claim, ecolabelling scheme or environmental product declaration).



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

LCA can be divided into four successive methodology phases as illustrated in Figure 1:

- 1. Goal and scope definition
- 2. Inventory analysis (LCI)
- 3. Impact assessment (LCIA)
- 4. Interpretation



Figure 1. The relationship between LCA framework and LCA applications [5]

As illustrated in Figure 1, LCA is an iterative process. During this process, it can be necessary to iterate between the four phases during the progress of an LCA. [4]

Goal and Scope Definition

Goal and scope definition is the first phase of LCA, and has a major influence on the quality of the assessment results. [1] It is a prerequisite that the performance of an LCA is consistent with the goal and scope definition. [4] Therefore, the goal should clearly define the purpose of the study, and the intended use and users of the results. [12] Besides, in the scope of the study it is important to identify the object of the study, the level of detail of the data, and to define what to include and exclude in order to attain the goal of the study. According to the definition of LCA, the whole life cycle of the product is to be included in the assessment (the systems demanded for generating, using and dismissing the product) This "cradle to grave" approach necessitates identification of the product's life cycle and of the processes participating. Especially in case of products with long service life (buildings), the definition of the life cycle incorporates assumptions or estimates of the functional service life time, use and maintenance scenarios, repair and replacement of components, major refurbishment or renovation scenarios, demolition and recycling scenarios, scenarios for technology development of supporting product systems such as electricity generation or transportation systems. [3] The ISO 14040 standard identifies several items (functional unit; system boundaries; allocation procedures; data requirement; assumptions; limitations; and critical review, if any) that should be considered, defined and clearly described in the scope of an LCA [5] as the obtained results will only be valid according to these definitions. [3] However, it often appears that the goal and scope has to be revised during the analysis caused by lack of data, important findings or similar, hence leading to LCA being iterative. [4]



Functional unit: The usefulness of a product is identified through its functional unit (FU). [3] The purpose of a FU is to provide a reference to which the input and output data are related. The amount of product necessary for fulfilling the function must be able to be quantified and is thereby FU has to be clearly defined and measurable. The flows related to the FU are then used to calculate the inputs and outputs of the system. Comparisons between systems are made on the basis of the same function, and quantified by the same FU. Then, it is the performance/service of a product which has to be comparable, not to the product itself. When comparing different building products, even the different product systems have to be comparable. [4] Hence the ISO standard states that "in comparative studies, the equivalence of the systems being compared shall be evaluated before interpreting the results". [5] For instance, it is no use to compare a roll of wallpaper with a roll of another type of wallpaper. "One square metre of wallpaper covered surface and a service life of 10 years" is suitable as a functional unit in this case.

System boundaries: The system boundaries define and structure the studied system; and are to be set in order to identify the extent to which processes are included/excluded, and to perform an inventory of inflows/outflows. The system must be drawn concerning geographical boundaries and the boundaries between technosphere and biosphere. [13]

Allocation procedures: The allocation is partitioning the input or output flows of a unit process to the product system under focus in several ways (e.g. between unit processes, a motivated principle is needed for how to allocate the flows). [4]

Critical Review: The critical review serves to ensure the quality of study by consulting a reviewer in order to ensure that methods used are consistent with ISO standards, scientifically and technically valid, data is appropriate in relation to the goal, interpretations reflect the goal, and the report is transparent and consistent. [5]

Life Cycle Inventory Analysis (LCI)

Inventory analysis is the second phase of an LCA, and consists of data collection and calculation procedures. The main purpose of the inventory analysis is to collect relevant information about the unit processes that constitute the studied system for the data categories and in accordance to the defined quality requirements presented in the goal and scope phase. [1] The system defined in goal and scope definition, is transformed into a flow diagram. Every activity in the diagram is divided into unit processes which are the smallest units in an LCA. Every unit process is connected with input and output as illustrated in Figure 2. Data is collected and evaluated with respect to the requirements defined in the goal and scope. Then, the data is related to each unit process and afterwards related to the functional unit. With these relations, it is possible to aggregate the data for each process, according to the functional unit. During the inventory analysis, it can be necessary to refine the system boundaries and the goal because of lack of data (see Figure 1). The result obtained is called a Life Cycle Inventory (LCI) and serves as input to the following impact assessment phase. [4]





Figure 2. Flow diagram consisting of unit processes [14] **Life Cycle Impact Assessment** (LCIA)

Life Cycle Impact Assessment (LCIA) is the third phase of LCA. The purpose of LCIA is to assess the life cycle inventory (LCI) results of the product systems, to better understand their environmental significance. In the LCIA phase selected environmental issues (impact categories) are modelled, and category indicators are used to condense and explain the LCI results. Category indicators are intended to reflect the aggregated emissions or resource use for each impact category. These category indicators represent the "potential environmental impacts". In addition, LCIA prepares for the life cycle interpretation phase. The LCIA can be divided into two main elements (see Figure 4). The first element is mandatory, and contains three phases to produce a LCIA profile. The second element is optional, and a further elaboration of the LCIA profile to create an aggregated value of the environmental impacts. [4]



Mandatory Elements: As illustrated in Figure 4, selection of impact categories, category indicators and models is the first step of the LCIA, and have to be appropriate to the goal and scope of the study The impact categories are identified in ISO 14047 as climate change, stratospheric ozone depletion, acidification, nutrification, human toxicity, ecotoxicity, and depletion of abiotic and biotic resources. [9] *Classification*, which is second step of the LCIA, is a procedure to assign the LCI results to the selected impact categories which is a rearrangement of the data. Finally, *characterisation* is a synonym for calculation of the category indicator. All the parameters in the different impact categories need to be multiplied with an equivalency factor to estimate their contribution to the impact category. In that way, each impact category can be presented as a one-dimensional numerical indicator, which is the final result of an LCIA. [4]

The concept of indicators is illustrated in Figure 3. As an example, acidification is chosen as an impact category. The category indicator is then proton release (H*), and the category endpoint is forest, vegetation, etc. Here models are needed to estimate the environmental effects at the endpoint. [4]



Figure 3. Concept of impact indicators [7, 9]

Optional elements: The result from the LCIA can be further elaborated by normalisation, grouping or weighting which are optional. *Normalisation* is to calculate the magnitude of the category indicator results relative to reference values. Also the impact categories can be sorted and/or ranked by *grouping*. Finally, the category indicators can be converted into one-dimensional value, using numerical factors based on value choices by *weighting*. [4]

Interpretation

The interpretation of the LCIA depends on the goal and scope of the analysis. In the interpretation of the result, the whole analysis has to be discussed, regarding data quality, scope and boundary settings, and validity of the study and sensitivity of results.

The four phases of LCA framework described above is illustrated in Figure 4 according to international ISO 14040 LCA standards series. [5-11]



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



Figure 4. Life cycle assessment (LCA) framework [5-11]



THE USE OF LCA METHODOLOGY IN THE BUILDING SECTOR

The LCA methodology which has developed rapidly during the recent years is to a large extent used for environmental assessments of short lived industrial products either to compare different alternatives or to propose improvements. As the methodology is adopted by the building sector, a number of sector specific considerations are faced. These considerations specific for the buildings are as in the following [3]:

• Each building is unique, and standardisation in the building sector is at minimum;

• The function of buildings is not always easy to define strictly in compliance with ISO. For instance, the function is not always only of a technical nature (e.g. the building) or the building itself, but rather a service (e.g. housing);

• It is not always possible to establish a FU in compliance with ISO;

• The time aspect, e.g. long service life compared to consumer products which has implications on energy and maintenance scenarios;

• The long service life of buildings has as a consequence that a major part of the environmental load associated with a building occurs during the usage phase;

• Disparate lifetimes for different building products included in the same system (building), which has implications on service life and maintenance scenarios;

• Disparate lifetimes for the same building products but in different functions included in the same system (building), which has implications on service life and maintenance scenarios;

• The high potential for recycling and reuse of building products, and whole building frames in combination with long service life has implications on end of life scenarios and how to handle distribution of environmental loads between life cycles.

The factors above have a big influence on the goal and scope definition, and inventory analysis. In that context, defining the life cycle stages of a building product with system levels should be useful in practical in order to provide a systematic procedure.

Life Cycle Stages and System Levels of Building Products

For LCA of a building product, the whole life cycle of the product has to be considered. A building product's life cycle is illustrated schematically in Figure 5.




Figure 5. Life cycle stages and system levels of a building product [4, 14-16]

According to the figure, the life cycle is divided into 6 stages related to chronological life cycle stages of the building product; and placed in 4 system levels related to the complexity of the structure in which the product participates. [2, 17, 18]

Extraction of raw materials (level 1): The life cycle of a building product (material or component) starts with extraction of raw materials, and goes on by being sent forward to a producer of building materials or components, or to the construction site for direct use.

Production of building materials or components (levels 2 and 3): The raw materials from the first LCA phase are normally converted into building materials or more complex products like building components or parts. Depending on product type this can be regarded as system level 2 or 3.

Construction: In this phase, the building products are applied to a whole building which means that the products are raised from system level 1, 2 or 3 up to level 4. The product starts to serve as or as a part of a function, and can be related to a "functional unit".

Use and maintenance of buildings (level 4): The building products are incorporated in a more complex system, (a building) in this phase. The environmental impacts from a functional unit in this stage depend on several factors other than the building product chosen for the actual function. Important factors here are types, methods, and intervals of maintenance.

Demolition: The demolition of a building indicates the end of a functional unit preserved by a building product. The functional unit is transformed back to a product, with or without a residual value.

Waste treatment, disposal or recycling/reuse (levels 1-3): After demolition, the outcome can be treated in different ways either as waste or reused/recycled in new applications. Depending on the fate of the product, the system level can be between 1 and 3.



Building Sector Specific Requirements for LCA Methodology

The building sector of today strives towards converting the design process of buildings from having a focus on the physical building towards using performance requirements as the basis for design. In other words, the focus is to satisfy the need for certain services rather than providing a simple physical structure. This approach has as a consequence that the assessed object is a dynamic system that provides different services over time based on the same physical structure. According to this approach sequential life cycle thinking should be adopted to accurately model the life cycle of the assessed building as the linear life cycle is not valid for a dynamic context. The sequential life cycle of a physical construction is a continuous process which can be divided in different activities such as construction, maintenance, rebuilding, extension, operation and "end of life scenarios". [1, 13] When assessing the building products during this process, there are two issues important to remember:

- LCA regards the whole life cycle of the building sequentially from cradle to grave;
- It is the function/service (performance) that must be regarded, not the product itself. [4]

In this context, the system with six levels (see Figure 5) can be simplified into two system levels (building product level and building level) in order to model the life cycle of the assessed building as flexible as possible. [19]

Building product (material and component) level: LCA can be applied to buildings on the building product level in order to derive information that will serve as decision support (e.g. for material choice), to compare products, and to generate input to whole building assessments. The product does not provide any function in building product level. Assessments on this level are characterised as being performed with a *bottom up approach*. The bottom up approach that are commonly used in the case of environmentally conscious building product choice situations are, due to the nature of a bottom up approach, not utilised to handle the usage phase of the assessed entity in a sufficient way. The bottom up approach is also quite common in methodologies for whole building assessments with the result that the whole buildings assessments usually suffer from the same incapacity to accurately assess the usage phase. [1]

Building level: LCA can be applied to buildings on the building level for further improvement and development. Furthermore, this assessment can help a decision support either in the design and construction of a building, or to establish the environmental status of existing buildings for a purchase situation, extension or alteration. The product provides a function supplied by other products in building level. Assessments on this level are characterised as being performed with a *top down approach*. The top down approach on the other hand is a better methodological approach when to assess whole buildings or the service that a building provides. [15]

Thereby, a simplification is done in Figure 6 regarding Figure 5 to emphasize the obstacles of the LCA methodology regarding building products as in the following [4]:

- 1. Before usage phase: Before installation of the product in a building;
- 2. Usage phase: During the usage phase in a building;
- 3. After usage phase: After the product is removed from the building.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



Figure 6. Two level system model [4]

CONCLUSION

As Life Cycle Assessment (LCA) methodology is adopted by the building sector, a number of sector specific considerations are faced which cause methodological problems when applying LCA to a building product. In order to guide to solve these problems by a systematic procedure, the life cycle stages of a building product with system levels are defined in this paper. The different life cycle stages of a building product can lead to various environmental impacts because of the processes like maintenance, resource use, emissions etc. It is hard to predict how a building product affects the environment in different LCA stages because of the structure of the building sector with different system levels and many actors. In every stage there are different aspects to take into consideration, and to be modelled. In this context, models should be studied and developed for every LCA stage and system level of a building product in further scientific researches.

REFERENCES

1. Borg, M. Environmental assessment of materials, components and buildings: building specific considerations, open-loop recycling, variations in assessment results and the usage phase of buildings. Ph.D Thesis, Kungliga Tekniska Hogskolan, Sweden **2001**.

2. <u>CIB Agenda21 on sustainable construction, CIB report publication 1999, 237,</u> <u>www.cibworld.nl</u>

3. <u>Trinius, W. Environmental</u> assessment in building and construction - goal and scope definition as key to methodology choices. Ph.D Thesis, Kungliga Tekniska Hogskolan, Sweden **1999**.

4. Paulsen, J. Life cycle assessment for building products - the significance of the usage phase. Ph.D Thesis, Kungliga Tekniska Hogskolan, Sweden **2001**.

5. ISO. Environmental management - life cycle assessment - principles and framework, ISO 14040: 1997(E). Geneva, 1997; 1 - 12.

6. ISO. Environmental management - life cycle assessment - goal and scope definition and inventory analysis, ISO 14041:1998(E). Geneva, 1998; 1 - 16.

7. ISO. Environmental management - life cycle assessment - life cycle impact assessment, ISO 14042: 2000(E). Geneva, 2000; 1 - 16.

8. ISO. Environmental management - life cycle assessment - life cycle interpretation, ISO 14043: 2000(E). Geneva, 2000; 1 - 18.

9. ISO. Environmental management - life cycle impact assessment - examples of application of ISO 14042, ISO/TR 14047: 2003(E). Geneva, 2003; 1 – 87.



10. ISO. Environmental management - life cycle assessment - data documentation format, ISO/TS 14048: 2002. Geneva, 2002; 1 - 80.

11. ISO. Environmental management - life cycle assessment - examples of application of ISO 14041 to goal and scope definition and inventory analysis, ISO/TR 14049: 2003(E). Geneva, 2003; 1 - 43.

12. Lindfors, L. G., Christiansen, K., Hoffman, L., Virtanen, Y., Juntilla, V., Hansson, O. J., Ronning, A., Ekvall, T., Finnveden, G. Nordic guidelines on life-cycle assessment. Nordic Council of Ministers, Copenhagen, 1995.

13. Erlandsson, M., and Borg, M. Generic LCA - methodology applicable for buildings, constructions and operation services - today practice and development needs. Building and Environment. **2003**, 38 (7), 919 - 938.

14. Paulsen, J. Life cycle assessment for building products - with special focus on maintenance and impacts from the usage phase. Licentiate thesis, Royal Institute of Technology, TRITA-BYMA, Sweden 1999.

15. Paulsen, J., Borg, M. A building sector related procedure to assess the relevance of the usage phase. The International Journal of LCA. **2003**, 8(3). 142 – 150.

16. Paulsen, J., Augenbroe, G. The role of energy use predictions in the choice of building materials. International Journal of Low Energy and Sustainable Buildings. **2001**.

17. Çelebi, G., Aydın, A. B. Sürdürülebilir mimarlık yaklaşımında yapı malzemelerinin irdelenmesi. IV. Ulusal Ekoloji ve Çevre Kongresi. Bodrum, 457 - 464, 2001.

18. SETAC-Europe. LCA in building and construction - A state-of-the-art report of SETAC-Europe. M711210/A801740/R990096/Asc/Pam, Working Group LCA in Building and Construction, Final Draft Report, Netherlands, 2001; 1 -31.

19. Trinius W., Le Téno J.F. System boundaries according to decision scope - A concept of focal zones. The International Journal of LCA. **1999**, 4(5).



COMPARATIVE ANALYSIS OF IMF POLICIES FOR FINANCIAL CRISES IN TURKEY AND ARGENTINA

Nihâl YILDIRIM-MIZRAK¹ and Mustafa ÖZER²

 ¹ Anadolu University, Faculty of Economics and Administrative Sci., Department of Economics, Eskişehir/YURKEY
² Anadolu University, Faculty of Economics and Administrative Sci., Department of Economics nmyildirim@anadolu.edu.tr

Argentina and Turkey seem to follow similar patterns of economic cycles. The Turkish experiment of the 1980s and Argentinean version of neo-liberalism in the 1990s both were initially considered as successful cases. Subsequent crises in both countries, however, uncovered the boundaries of the neo-liberal model they had adopted.

Since the crises stroke both countries in the early 2000s, once again both countries are seemingly doing relatively well. There is a difference though. Turkey remains as a good student of the IMF whereas Argentina has refused to follow IMF advice.

This paper first investigates the causes of crises within the context of IMF policies. It then compares their current policies to consider whether they are sustainable.

1.INTRODUCTION

Argentina and Turkey seem to follow similar patterns of economic cycles.

The Turkish experiment of the 1980s and Argentinean version of neo-liberalism in the 1990s both were initially considered as successful cases. Subsequent crises in both countries, however, uncovered the boundaries of the neo-liberal model they had adopted.

Since the crises stroke both countries in the early 2000s, once again both countries are seemingly doing relatively well. There is a difference though. Turkey remains as a good student of the IMF whereas Argentina has refused to follow IMF advice.

This paper first investigates the causes of crises within the context of IMF policies. It then compares their current policies to consider whether they are sustainable.

We will study this topic in six sections. Section 2 provides the historical background of the International Monetary Fund (IMF) and its essential role as an international institution. We are also discussing the recent critiques against the Fund's policy and the crisis of legitimacy that it faces in the last decades. Section 3 presents first of all a very general overview of the Turkish economy over the two periods (in the pre-1980 period and in the post-1980 period) and the macroeconomic policies in these years. This section analyzes the IMF programmes which are implemented in the 1990s and in the early 2000s. We'll also discuss in this section the IMF's policies applied during the financial crises in Turkey.



Section 4 provides also an analysis of the Argentina's economy and the IMF's policies in this country.

Section 5 compares the two economies in the context of IMF policies and their results, and presents the concluding remarks and contains some policy suggestions.

2. The critical view of IMF's policy and IMF-supported programs in emerging market economies

As we know, the IMF was created as a multinational institution to promote economic integration among its members and allow a coordinated response to economic problems transmitted internationally through trade and payment flows. Its foundation in 1944 was motivated by the Great Depression in 1930s. The Fund was given two important tools to mitigate, and ideally prevent future crises. These were the surveillance over exchange rates and international payments policies of its members as a way of eliminating a key channel of international crisis transmission; and balance of payments lending, to offer members an alternative to external or fiscal adjustment mechanisms that would be harmful to the member or to other members.

Having the two tools, the IMF helped facilitate the growth and trade integration that followed the Second World War (Ostry and Zettelmeyer, 2005:4). But more than sixty after its foundation, the economic environment in which it operates, and the adequacy of its tools in relation to its task, have greatly changed. For example, the demise of Bretton Woods system in the early 1970s eliminated surveillance over exchange rate parities as the main pillar of Fund activitiy.

The environment in which it has operated since the early 1980s have once again changed in the latest wave of financial crises that began with the December 1994 collapse of the Mexican peso, the Russia's crisis in 1998, the crises in Argentina and Uruguay, 2001-2003 and the financial crises in Turkey in 1994, 1998 and November 2000-February 2001.

As a result, the critiques against the Fund began to be severe. Now the Fund is facing a crisis of legitimacy. There is a crisis of legitimacy of the IMF with the public; problems of the IMF's credibility, and appropriateness of its policies in relation to many recipient countries; erosion of confidence in the IMF within the establishments of major shareholder countries; and also debate on IMF policy and strategy within the IMF staff themselves. In fact, Nouriel Roubini, ex-economist of the Fund, has criticized the policy of the Fund regarding Argentina (Yeldan, 2005: 1) and Anne Krueger, vice-president of the Fund, criticized in 2002 the credit-mechanism of the IMF (www.imf.org). According to Krueger, in the developing countries, the convertibility of the private-sector external debt to the debt of the public sector was wrong.

Some other critics of IMF policies have argued that the Fund has drifted away from Keynesian principles by seeming to emphasize fiscal and monetary discipline over growth. Joseph Stiglitz has put this argument precisely in pointing out that "the Fund has taken on the pre-Keynesian position of fiscal austerity in the face of a downturn, doling out funds only if the borrowing country conforms to the IMF's views about appropriate economic policy, which almost always entail contractionary policies leading to recessions or worse" (Stiglitz, 2002: 38).



The IMF's credibility was also so much discussed since the Asian financial crisis in the 1990s within the establishments such as academic and media. Today most Asian countries have rejected the IMF policies. They have built up larger foreign currency reserves and taken steps to avoid another financial meltdown. Many Latin American countries have similarly reduced or eliminated their dependence on the IMF. Argentina and Brazil have pre-paid their loans, not wanting to have to follow advice which they believe is often wrong. As a result, the IMF is becoming irrelevant as a loan-maker. Many countries prefer to borrow from the market or from other institutions. This has forced the IMF secretariat to face up to the grumbles of developing countries that they have little say in the decisions of the organisation, which as everyone knows is really run by a few developed countries. The Singapore meeting of the IMF and the World Bank on September 2006 discussed this problem and the dominance of the developed countries within the Fund (TWN, September 2006:1-2). So, it is important to analyze briefly how has the IMF performed with regard to the prevention and mitigation of emerging market financial crises. In the last decade, we saw a mix of successes and failures. The Fund could take some credit for the improvement in the standards of macroeconomic policy making around the world, from the struggle against the inflation to the adoption of fiscal rules and inflation targeting frameworks, better debt management and the avoidance of dangerous debt structures. That's the successful side of the policy advice of the Fund. However, these improvements were not sufficiently universal to prevent the crises of the 1990s. In some countries, the IMF also underestimated the risks of opening capital accounts in an environment of weak financial sector institutions. In consequence, there was a new wave of crises that led to requests for IMF assistance, such as Turkey. We'll analyze this point in Regarding to Fund's policy of rescuing, it is accepted that detail in the third section. interventions in the aftermath of a currency crisis - like Mexico in 1995-shortened the duration of the crisis and put recoveries on a more solid footing (Boughton, 2004). But, the Fund crisis lending was not enough sufficient to prevent great contractions in output and current account reversals prior to those recoveries, the international spread of crisis and the overshooting of the exchange rate. The rescue packages negotiated with some countries did not succeed in averting a devaluation, but prevented a default and softened the blow of the crisis. For example, the December 2000 programme augmentation with Turkey and the November 1998 Brazilian package. According to a paper realized in 2005, the IMF, itself, recognized a number of weaknesses concerning the aspects of the Fund surveillance and lending operations (Timothy Lane, 2005). Examples include the surveillance had been insufficiently focused on vulnerabilities arising in the financial sector, and did not pay enough attention to the links between financial sector, corporate sector, and public sector balance sheets; transparency in IMF surveillance and lending operations was not enough convincing, and the prospect of IMF help may have encouraged excessive capital inflows and debt accumulation, in some middle income countries. In response to these concerns, the Fund took steps to reform its operations as we mentioned above (the Singapore meeting of the IMF and the World Bank on September 2006). We'll analyze in detail the results of these attempts in the sections 3 and 4.



3. Economic crises and the IMF policies in Turkey

Following economic crises in the 1990s, Turkey has been implementing an IMF programme the early 2000s. This programme has involved free capital flows, including short-term capital, further trade liberalization, privatisation and deregulation within the Turkish economy. The main objective of the programme was a stabilisation policy which has the aim of reducing the rate of inflation from 80 % in 2000 to single-digit levels.

Before analyzing the effects of these policies, we'll provide a historical background of the macoreconomic evolution in Turkey over the period of 1960-2004 and the period of 2004-2006. As we see in the Table.1, we summarize the Turkish economy over the certain macroeconomic indicators such as economic growth, capital accumulation, employment, stability and openness.

In the pre-1980 period, Turkey adopted a state-led inward-oriented growth policy. This strategy was including the import substitution policies and the planning of the economy as a whole. To do this, State Planning Organization has been founded. For promoting industrialization and economic development, it is invested largely in the manufacturing sector.

As we realize in the Table.1, during the period of 1960-1980, Turkey saw a high rate of growth (4,7%). In this period, the rate of capital accumulation was modest, the real capital stock growth (average annual rate) was 5,5%. But the macroeconomic environment was quite stable in this period. It is important to note that this stability was not shown between 1973 and 1977 where the political unstability was evident which led to inconveniable policy making. This increased the macroeconomic instability. As a result, this instability index and inflation increased from respectively 0,049 points and 5,4% in the 1960s to 0,118 points and 27% in the 1970s (Metin-Özcan; İsmihan, 2006: 5-6).

In 1980 Turkey adopted an extensive programme of economic stabilization and liberalization. The main feature of this programme was the export-led growth strategy. So the economy moved from being inward-oriented and isolated to being export-oriented and integrated into world trade and financial markets. The economic role of the state changed with this programme. In fact, the public investment strategy has changed from manufacturing to infrastructure as you can see in the Table.1. The share of the public infrastructure investment in the GNP rised from 3.5 % in the 1970s to 4.6 % in the 1980s.

Starting from the late 1980s "political and macroeconomic instability increased and persisted as endemic characteristics of the Turkish economy during the 1990s. Populist and myopic policies, and the associated problems of public sector imbalances were blamed most for the persistence of high macroeconomic instability from the late 1980s onwards" (Metin-Özcan; İsmihan, 2006: 7). The high domestic borrowing policy with the help of capital flows led the high interest rates and unsustainable debt dynamics during the late 1990s. High inflation of the second half of the 1980s, which averaged around 60 %, increased to around 80 % in the 1990s, as we can see in the Table.2.



The consequence was that the gap between Turkey and the poorest economies of the European Union (EU), such as Portugal, increased. The Portugal increased its per capita income five fold to 12,000 US dollars in 20 years (in 1982 it was 2412 US dollars, based on nominal GDP at current prices) while the figure on the Turkish economy ranged between 2000-3000 US dollars in the same period (in 1982, per capita income was 1289 US dollars. The contrast in economic performance with some Asian countries, whose growth in the 1990s averaged in the 5 % to 7 % range, is also spectacular (www.undp.org).

The Table.2. gives also the income per capita GDP in Turkey in terms of the PPP calculated in US dollars.

While the Persian Gulf crisis 1990-1991, the Russia's financial crisis in 1998 and the catastrophic earthquakes in 1999 have to share some of the responsibility for increasing output instability and poorer economic performance as a whole, domestic policy decisions also played a great role. Particularly, "the internal reason for this less than satisfactory economic performance rests on the abelity to put in place and sustain a series of policies that would bring the initial reforms to maturity. The enduring symbol of the incompleteness of the structural reform process is the persistent and high inflation "(Kibritçioğlu; Rittenberg; Selçuk, 2002: 4).

Therefore, in the last of the 1990s, Turkey embarked on a series of disinflation programmes. After the financial crisis of 1994, she entered into a stand-by arrangement with the IMF. This was quickly abandoned, because of the relatively expansionary policies. But the government once again began negociations with the Fund in 1998, but the pressures coming from the Russia's financial crisis in 1998, the general elections in April 1999 and the two great earthquakes in August and October of 1999 made the political and economic environment so tense.

Finally, the country signed a three-year IMF-based stand-by agreement in December 1999. A main tool of the disinflation programme was the adoption of a crawling peg regime. To support this disinflation objective, the programme was also including the stringent fiscal policy, obtained through tax increases and changes in public sector wages and agricultural price supports in line with the inflation targets; structural reforms for the banking, agriculture, energy, social security sectors, and a renewed privatization policy. So the main aim was also to solve public imbalances.



| | 1960s | 1970s | 1980s | 1990s | 2000s | 1960- | Pre- | Post- |
|-----------------|-------|-------|-------|-------|-------|-------|--------|--------|
| Indicators | | | | | | 2004 | 1980 | 1980 |
| (Annual average | | | | | | | (1960- | (1960- |
| growth rates) | | | | | | | 1980) | 2004) |
| Real GDP | 5,4 | 4,1 | 5,2 | 3,6 | 3,6 | 4,5 | 4,7 | 4,3 |
| Capital | 5,9 | 8,0 | 4,3 | 5,2 | 1,8 | 5,5 | 7,0 | 4,2 |
| Employment | 1,4 | 1,8 | 1,2 | 1,0 | 0,2 | 1,3 | 1,6 | 0,9 |
| (for the | | | | | | | | |
| indicators | | | | | | | | |
| below: Period | | | | | | | | |
| average) | | | | | | | | |
| Macroecenomic | 0,049 | 0,118 | 0,347 | 0,468 | 0,479 | 0,271 | 0,100 | 0,422 |
| Instability | | | | | | | | |
| Index(MII) | | | | | | | | |
| Inflation Rate | 5,4 | 27,0 | 50,4 | 73,2 | 36,5 | 38,7 | 19,7 | 56,8 |
| | | | | | | | | |
| Public | 5,7 | 9,0 | 9,1 | 6,2 | 6,0 | 7,3 | 7,5 | 7,3 |
| Investment/GNP | | | | | | | | |
| Private | 10,2 | 14,2 | 11,3 | 17,6 | 13,2 | 13,3 | 12,2 | 14,2 |
| Inv./GNP | | | | | | | | |
| Public | | | | | | | | |
| infrastructure | | | | | | | | |
| inv./GNP | 2,2 | 3,5 | 4,6 | 3,2 | 2,8 | 3,3 | 2,9 | 3,7 |
| Exports/GNP | 4,6 | 3,5 | 9,9 | 11,6 | 19,2 | 8,7 | 4,1 | 12,4 |
| Imports/GNP | 6,8 | 7,8 | 15,0 | 19,2 | 29,1 | 14,1 | 7,5 | 19,5 |

Table.1. The macroeconomic performance of the Turkish economy, 1960-2004

Source: Metin-Özcan, Kıvılcım; İsmihan, Mustafa (2006), "The growth performance of the Turkish economy", Bilkent University, Discussion paper 06-10: 31

This IMF-programme has failed in February 2001. The Turkish lira was allowed to float starting on February 22, 2001. Over the next few months the TL lost half of its value. As a result, the economy is expected to shrink by about 9 % in 2001. Indeed, the real gross domestic product decreased by more than 7% during this year.

Hence another programme, with the IMF and the World Bank, was signed. The actual government is continuing to implement this programme since 2002. Macroeconomic stability was restaured, and the country saw a very high economic growth rate. As it is shown in the Table.2, the real GDP grew at annualy respectively 7.9 %; 5.8%; 8.9% and 7.4% in the period of 2002 and 2005. But, it is important to note that the most unhappy characteristic of this high economic growth rate was the failure to create jobs. In fact, unemployment is presented always as a great problem in Turkey as we see in the Table.1 and also in the Table.3 which gives the evolution of the employment and related figures in detail from 1980 to 2005.



As far the Table.4, it contains the current account balance for the post-2000 period.

| Years | Per Capita GDP | Consumer Price | GDP (% | GNP (% |
|------------|----------------|----------------|---------|---------|
| | ± | Index | change) | change) |
| | | (% change) | | |
| 1980 | 2 299 | 101 | -2,4 | -2,8 |
| 1981 | 2 582 | 34 | 4,9 | 4,8 |
| 1982 | 2 768 | 28 | 3,6 | 3,1 |
| 1983 | 2 935 | 31,4 | 5,0 | 4,2 |
| 1984 | 3 179 | 48,4 | 6,7 | 7,1 |
| 1985 | 3 354 | 45,0 | 4,2 | 4,3 |
| 1986 | 3 598 | 34,6 | 7,0 | 6,8 |
| 1987 | 3 971 | 38,9 | 9,5 | 9,8 |
| 1988 | 4 119 | 68,8 | 2,1 | 1,5 |
| 1989 | 4 217 | 63,3 | 0,3 | 1,6 |
| 1990 | 4 699 | 60,3 | 9,3 | 9,4 |
| 1991 | 4 806 | 66,0 | 0,9 | 0,3 |
| 1992 | 5 143 | 70,1 | 6,0 | 6,4 |
| 1993 | 5 562 | 66,1 | 8,0 | 8,1 |
| 1994 | 5 271 | 106,3 | -5,5 | -6,1 |
| 1995 | 5 411 | 88,0 | 7,2 | 8,0 |
| 1996 | 5 982 | 80,4 | 7,0 | 7,1 |
| 1997 | 6 442 | 85,8 | 7,5 | 8,3 |
| 1998 | 6 2 3 6 | 84,6 | 3,1 | 3,9 |
| 1999 | 5 923 | 64,9 | -4,7 | -6,1 |
| 2000 | 6 212 | 54,9 | 7,4 | 6,3 |
| 2001 | 5 738 | 54,4 | -7,5 | -9,5 |
| 2002 | 6 158 | 45,0 | 7,9 | 7,9 |
| 2003 | 6 993 | 25,3 | 5,8 | 5,9 |
| 2004 | 7 756 | 10,6 | 8,9 | 9,9 |
| 2005 | - | 5,89 | 7,4 | 7,6 |
| 2006(II.O) | - | 9.6 | 7.5 | 8.5 |

Table.2. Per Capita Income (in terms of PPP, US\$)¹ and Consumer Price Index(% change)² and the growth rates of GDP* and of GNP* (% change)³ in Turkey.

Sources: (1) State Planning Office (www.dpt.gov.tr); (2) for 1980-1982 Treasury Statistics; for 1983-2005 Turkish Statistical Institute (www.tuik.gov.tr); (3) TUIK -Turkstat. (*) At 1987 Producers' Prices, percentage change.



3.a. The impacts of the IMF-based policies in Turkey

The actual programme of international and local capital implemented under the guidance of the IMF and World Bank has some impacts on the economic and social situation in Turkey. Indeed, two important consequences of these programmes. The first one is the huge deficit of the current account. The second consequence is the failure to create jobs, as a result, the high rate of unemployment.

Indeed, the current account deficit rised to 22,4 billion dollars in 2006 (8,1 % as a percentage of GDP) as we can see in the Table.4. We analyzed this crucial problem in detail in the subsection 3.a.1. below.

The rate of open unemployment, realized at 10.3 % in 2002, first increased to 10.5% in 2003 and then remained at 10.3% in 2005 (see the Table.3). The rate of open unemployment remains high in particular among the young urban population. As we mentionned above, the high economic growth does not create jobs. In fact, unemployment is presented as a great problem to solve. As we see in the Table.1, the employment rate of 0,9 % was so modest in the post-1980 period while the rate was 1,6 % in the pre-1980 period. The evolution of the employment and related figures in detail from 1980 to 2005 in Turkey are given in the Table.3, and the Table.4 presents the current account balance and other macroeconomic indicators for the post-2000 period.

As a result, Turkish economy is still considered as a fragile economy. Indeed, the economy was hit hard by May-June 2006 turmoil international markets which served to underscore its remaining vulnerabilities, but has recovered rather rapidly. The current account deficit, which will likely reach a historically high level above 8 % of GDP in 2006, continues to be financed by growing private debt and foreign direct investment (FDI), as we can see in the Table.4. According to OECD studies, strong GDP growth is expected to continue during the years 2007-2008 but risks remain (Oecd outlook, 2006:107). Maintaining fiscal discipline is crucial while monetary policy credibility needs to be bolstered, particularly by consolidating the independence of the central bank. The transparency and quality of fiscal institutions needs to be strengthened by adopting international accounting standards and multi-year spending targets for general government. Additional structural reforms are required to enhance the competitiveness of the economy, promote the formal sector and rein in the high current account deficit.



| | 1980 | 1985 | 1990 | 1995 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Population ¹ | 44439 | 50307 | 56156 | 61737 | 67420 | 68529 | 69626 | 70712 | 71200 | 72100 |
| Active | - | - | 35601 | 41175 | 46211 | 47158 | 48041 | 48912 | 49908 | 50826 |
| population ² | | | | | | | | | | |
| Labour force | - | - | 20150 | 22286 | 23078 | 23491 | 23818 | 23640 | 24289 | 24565 |
| Employed | 16523 | 17547 | 18539 | 20586 | 21581 | 21524 | 21354 | 21147 | - | - |
| Unemployed | 1487 | 1377 | 1611 | 1700 | 1497 | 1967 | 2464 | 2493 | 2498 | 2520 |
| Domestic | - | - | 56,6 | 54,1 | 49,9 | 49,8 | 49,6 | 48,3 | 48,7 | 48,3 |
| Participation | | | | | | | | | | |
| Rate (% | | | | | | | | | | |
| change) | | | | | | | | | | |
| Unemployment | 8,3 | 7,3 | 8,2 | 7,6 | 6,5 | 8,4 | 10,3 | 10,5 | 10,3 | 10,3 |
| Rate (%) | | | | | | | | | | |
| Sectoral | | | | | | | | | | |
| Distribution of | | | | | | | | | | |
| Employment | | | | | | | | | | |
| (%) | | | | | | | | | | |
| Agriculture | 54,2 | 50,4 | 46,9 | 44,1 | 36,0 | 37,6 | 34,9 | 33,9 | | |
| Industry | 20,0 | 21,1 | 20,2 | 22,0 | 24,0 | 22,7 | 23,0 | 22,8 | | |
| Services | 25,8 | 28,5 | 33,0 | 33,9 | 40,0 | 39,7 | 42,1 | 43,4 | | |
| Total | 100,0 | 100,0 | 100,0 | 100,0 | 100,0 | 100,0 | 100,0 | 100,0 | | |

| Table.3. Labour force and Employment in Turkey, in the post-1980 per | riod (in thousands) |
|--|---------------------|
|--|---------------------|

¹ Figures are given for 15 over of age after year 2000, and 12 and over of age before 2000. ² For 2001-2005 period, Estimations according to the figures of 2000.

Source: Turkstat (TUIK).



| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005* | 2006* |
|----------------------|---------|---------|---------|---------|---------|----------|---------|
| Current | -9 819 | 3 392 | -1 524 | -8 036 | -15 604 | -23 155 | -22 422 |
| Account | | | | | | | |
| Balance | | | | | | | |
| CA as a % of | | | | | | | |
| GDP (1987 | | | | | -5.1 | -6.4 | -8.1 |
| prices) ¹ | | | | | | | |
| Exports f.o.b. | 30 721 | 34 373 | 40 124 | 51 206 | 67 047 | 76 949 | 56 185 |
| of goods | | | | | | | |
| Imports f.o.b. | -53 131 | -38 106 | -47 407 | -65 216 | -90 925 | -109 875 | -84 165 |
| of goods | | | | | | | |
| Balance on | -22 410 | -3 733 | -7 283 | -14 010 | -23 878 | -32 926 | -27 980 |
| goods | | | | | | | |
| Services:credit | 20 364 | 15 199 | 14 025 | 17 945 | 22928 | 25 849 | 15 939 |
| Services:debit | -8 996 | -6 067 | -6 146 | -7 441 | -10 144 | -11 883 | -7577 |
| Balance on | | | | | | | |
| goods and | | | | | | | |
| services | -11 042 | 5 399 | 596 | -3 506 | -11 094 | -18 960 | -19 431 |
| Export-Import | 51,0 | 75,7 | 69,9 | 68,1 | 64,8 | 62,9 | 55,9 |
| Ratio (%) | | | | | | | |
| Foreign Direct | | | | | | | |
| Investments: | | | | | | | |
| -inflows | 1707 | 3374 | 622 | 743 | 1291 | 8537 | 12407 |
| -outflows | 725 | 22 | 5 | 8 | 100 | 336 | 1023 |
| -net | 982 | 3352 | 617 | 737 | 1191 | 8201 | 11384 |
| Real | | | | | | | |
| Exchange | | | | | | | |
| Rate Index | | | | | | | |
| (1987=100) | 152,04 | 123,05 | 137,75 | 151,74 | 162,08 | 179,57** | 174,61 |
| External Debt | 118 503 | 113 560 | 130 164 | 145 000 | 162 261 | 170 621 | 193 617 |
| (As a % of | | | | | | | |
| GNP) | - | - | (72,1) | (61,0) | (54,1) | - | - |
| Domestic | | | | | | | |
| Debt as a | | | | | | | |
| percentage of | | | | | | | |
| GNP(%) | 29.0 | 69.2 | 54.5 | 54.5 | 52.3 | 50.3 | - |

Table.4. Current Account, and macroeconomic indicators in Turkey, 2000-2006 (in millions of US dollars)

(*) For 2005, provisional; for 2006: January-August 2006. (**) For January-December 2005 (¹) OECD, Preliminary Outlook, Paris, 2006: 107.

Source: Central Bank of Turkey (TCMB); State Planning Office (DPT); Treasury.



3.a.1.The evaluation of the current account deficits

As is well known, current account deficit in national income accounting system represents the investment-saving gap. If there is a deficit in the current account, deficit should be financed by inflow of foreign resources. The balance on current account depends on balance on goods and services, balance on investment income and balance on current transfers.

Figure.1 illustrates the development of current account balance in Turkey since 1993. As is seen clearly, the current account deficit in Turkey widened prior to both 1994 and 2000 economic crises. Also, it has been widening after 2001 crisis period, and reached almost over the %6 of GNP. Trends in current account deficit seem to be one of most important fragilities of Turkish Economy. Therefore, causes and the way of financing the current account deficit need to be explained in detail.

We can see the stated relationship between saving-investment gap and changes in foreign inflows of resources clearly from Figure.2 and Figure.3.

Figure.2 shows the both public and private sectors investment-saving gap and changes in the inflows of foreign resources. Figure.3 exhibits the saving and investment balances as percentage of GNP.



Figure.1. Current Account Balance in Turkey, 1993-2005.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



Figure.2. Saving and Investment Gap of public and private sectors, and foreign resources.



Figure.3. Saving and Investment Balances (as a % of GNP)



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



Figure.4. Current account deficits in Argentina, 1978-2002.



Both figures show that widening current account deficit in Turkey is associated with the widening gap of saving and investment particularly widening gap of private sectors saving-investment after the 2001 period. This period also witness sudden rise of inflows of foreign resources. To determine the main source of the widening current account deficit, we have to look at closely to devolopment of its components. Figure.3 shows how all these components of current account deficit change. As the figure clearly indicates that main source of the widening current account deficit is sharp and dramatic rise in trade deficit (the blue line in the figure).



| | 2001 | 2002 | 2003 | 2004 | 2005 |
|--|-------|------|------|-------|-------|
| Current Account | 3,4 | -1,5 | -8 | -15,7 | -23,2 |
| Capital and Financial Account | 1,7 | 1,2 | 3,1 | 13,4 | 20,9 |
| Direct Investment Abroad | -0,5 | -0,2 | -0,5 | -0,9 | -1,1 |
| Direct Investment in Turkey | 3,3 | 1,1 | 1,8 | 2,9 | 9,8 |
| Portfolio Investments-assets | -0,8 | -2,1 | -1,4 | -1,4 | -1,2 |
| Portfolio Investments-Liabilities equity | | | | | |
| securities | -0,1 | 0,0 | 0,9 | 1,4 | 5,7 |
| Portfolio Investments-Liabilities debt | | | | | |
| securities | -3,6 | 1,5 | 2,9 | 8,0 | 9,0 |
| Other Investments-Assets | -0,6 | -0,8 | -1,0 | -7,0 | 0,2 |
| Other Investments-Liabilities | -12,3 | 8,0 | 4,4 | 11,1 | 16,4 |
| Reserve Assets | 12,9 | -6,2 | -4,0 | -0,8 | -17,8 |
| Net Errors And Omissions | -1,7 | 0,1 | 4,9 | 2,2 | 2,2 |
| | | | | | |

Table.5. Current Account Balance and its financing in Turkey (in billions of US Dollars).

Source: Central Bank of Turkey (TCMB).

| Table.6. Macroeconomic indicators in Argenti | ina (in millions of US dollars). |
|--|----------------------------------|
|--|----------------------------------|

| | 1995 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005* |
|--|----------|----------|----------|----------|----------|----------|-------|
| Growth rates of GDP (annual | | | | | | | |
| rate of variation) | -2.8 | -0.8 | -4.4 | -10.9 | 8.8 | 9.0 | 9.2 |
| Growth rates of per capita GDP | -4.0 | -1.8 | -5.4 | -11.7 | 7.8 | 8.0 | 8.2 |
| GDP at constant 2000 prices (in dollars) | 250382.8 | 284345.9 | 271809.2 | 242197.4 | 263599.6 | 287401.7 | |
| Per capita GDP (in dollars at constant 2000 prices) | 7199.3 | 7730.2 | 7315.4 | 6455.8 | 6960.6 | 7518.5 | |
| Balance on CA | -5174.7 | -9015.5 | -3290.5 | 8668.0 | 8018.6 | 3331.7 | |
| Balance on CA as a % of GDP | -2.0 | -3.2 | -1.2 | 8.5 | 6.2 | 2.2 | |



| Balance on | 2357.4 | 2451.9 | 7384.9 | 17177.5 | 16804.6 | 13239.1 | |
|-------------------|----------|----------|----------|----------|----------|----------|--|
| Balance on | -3416.9 | -4322.5 | -3862.6 | -1589.1 | -1394.5 | -1644.4 | |
| services | | | | | | | |
| Exports of | | | | | | | |
| goods,f.o.b. | 21161.7 | 26341.0 | 26542.7 | 25650.6 | 29938.8 | 34550.2 | |
| Imports of | -18804.3 | -23889.1 | -19157.8 | -8473.1 | -13134.2 | -21311.1 | |
| goods,f.o.b. | | | | | | | |
| Net FDI | | | | | | | |
| (millions of | 4112.2 | 9517.3 | 2005.2 | 2776.0 | 878.2 | 3922.6 | |
| dollars) | | | | | | | |
| Total external | | | | | | | |
| debt (year-end- | | | | | | | |
| balance, millions | | | | | | | |
| of \$) | 101462.0 | 155015.0 | 166272.0 | 156748.2 | 164918.5 | 171115.3 | |
| Total external | | | | | | | |
| debt as a % of | | | | | | | |
| GDP | 39.3 | 54.5 | 61.9 | 153.6 | 127.3 | 111.8 | |

Table.6. Cont.

(*) Preliminary figures

Source: Statistical Yearbook for Latin America and Caribbean 2005, www.eclac.org

| | 2001 | 2002 | 2003 | 2004 | 2005 |
|---------|------|------|------|------|------|
| Brazil | 22,5 | 16,6 | 10,1 | 18,2 | 12,5 |
| Hungary | 3,9 | 3,0 | 2,2 | 4,2 | 5,3 |
| Poland | 5,7 | 4,1 | 4,1 | 6,2 | 6,2 |
| Romania | 1,2 | 1,1 | 2,2 | 6,4 | 6,3 |
| Turkey | 3,3 | 1,0 | 1,7 | 2,6 | 8,6 |

| Table.7. Net FDI in some countries. | 2001-2005 (in millions of US Dollars) |
|-------------------------------------|---------------------------------------|
| | |

Source:For 2001-2004:different reports related to countries from the website of Unctad. For 2005: Unctad, World Investment Report, 2006

So far as we conclude that there is widening current account deficit mainly driving by sharp rise in trade deficit. But most importantly, whereas the widening current account deficit can be seen as an indicator of crisis as was happen both 1994 and 2000 and 2000 crises, the way of financing the current account deficit should be paid more attention. Because it is a common belief that as long as the current account deficit is financed not to causing the accumulation of foreign debt or by debt instruments, such as the capital inflows of the form of debt instruments and other investments, the current account deficit should be considered as sustainable one. In other words, if it is financed mainly by the instruments such as direct investment and portfolio investment in the form of equity securities.



As we seen clearly from Table.5, recent sharp rise in the current account deficit is mainly financed by debt accumulating instruments, such as portfolio investments in the form of debt securities and other investment liabilities. Also, net errors and omissions which are unrecorded inflows of capital, play an important role in financing the current account deficit. Therefore, it is fair to conclude that we should worry about the way of financing the current account deficit and should take it as an indication of fragility of Turkish economy. Table.5. gives us the sources of financing the current account deficit between 2001 and 2005.

4. The 2001 Economic crisis and the IMF policies in Argentina

The huge economic collapse in Argentina in December 2001, culminating in 2002, resulted in the deepest political and economic crisis in generations. Consequently, the country has experienced economically catastrophic events. From 1999 to 2002, gross domestic product (GDP) fell by over 20 %. The human costs of the precipitous decline in economic activity have been substantial. The urban poverty rate shot up to 57.5 % in October 2002 (Valdovinas, 2005: 1), while income inequality, which had been rising steadily, peaked in the aftermath of the crisis. The unemployment rate has risen from 12.4 % in 1998 to 14.7 % in 2000, and to 18.3 % in 2001.

As we can see in the Table.6, Argentina's economy began to rebound by 2003. A demand-led recovery emerged by increased exports and by a gradual expansion of consumption spending. This has had a positive impact on the living standards of the population. Nevertheless, the economic and social advances were relative to their very low starting point. In fact, one of the difficult tasks that the country faces actually is to implement policies needed to support the economic recovery, assist employment creation, and enhance the living conditions of the population (according to the figures of 2003, the total population of Argentina is 38.0 millions). If we reviews the evolution of the economic growth of Argentina over the period 1950-2004 (WB, Report), per capita income diverged downward vis-à-vis the industrialized countries, while its per capita income converged downwards towards Latin America's. Even among Latin American countries, Argentina has look as a slow growth country (except Venezuela and Bolivia). So, it is important to give convincing answers to this languishing performance of Argentine growth. In the last several decades, inequality has increased significantly, resulting on the other hand in rising levels of poverty in the face of stagnant average per capita output. In fact, per capita GDP of 7518 dollars in 2004 (see Table.6) was about the same level as in 1974. However, poverty was much higher in 2004, reflecting an unequal distribution of income.

As suggested by some empirical studies (Valdovinas, 2005: 3), there also has been substantial volatility in economic performance over time in Argentina. In fact, during the period of 1960-1999, the country possessed greater output volatility reaching its peak during the chaotic decade of the 1980s. One perspective explains these facts by a lack of productivity growth. So, for achieving sustained high rates of economic growth, the empirical studies suggest these actions like facilitating private sector investment, strengthening the legal institutional framework, having a well-functioning system for financial mediation, promoting trade expansion, and extending human capital formation (Banerjee; Duflo, 2003).



As we mentionned above, the economic recoveries after the crises in Argentina didn't permit to high rates of growth. They have been rather a pro-poor growth process. We can give an example from the 1990s. It was argued that during this decade, interest rates decreased relative to wages, and the most dynamic sectors tended to be capital-intensive. Consequently, real currency depreciation after the crisis reduced the cost of labor; as a result, labourintensive sectors became more competitive. In fact, the average real wage is decreased from 976 Pesos in 1999 to 769 in 2002 (Koyuncu; Şenses, 2004: 13)

Another explanation is that, as a result of IMF-stability policies in the 1990s, the disinflation policy was successful while the rate of unemployment was dramatically increased in the 1990s and in the early 2000s. Le taux d'inflation was decreased from 2300 % to 4 % between 1990-1994 (Faucher; Armijo, 2004: 396-398). But the rate of unemployment has increased from 6.5% in 1991 to 17.5% in 1995, to 14.2% in 1999 and to 19.7% in 2002 (Koyuncu; Şenses, 2004: 13).

Since labor income is more important among the poor as a share of total income, these policies have led to worsen the social and economic impacts of the economic recovery period led by IMF. The IMF rescue package negotiated with Argentina in August 2001 did not prevent chaotic, painful crisis a few months later, and in December 2001, the deepest economic collapse happened, as we underlined before. Argentina's case has been an example for the arguments that IMF-led stability programmes were not sufficient to prevent large contractions in output and current account reversals (see the figure.4).

It is worthwhile to note that the Argentine government declared that IMF programme, which not only has greatly increased the external foreign debt (more than 160 billion of dollars in 2001, see the Table.6), but also the economic instability as a whole, was unsustainable. It then stopped it in 2001 and declared to suspend to pay his external debt. The IMF insisted its policies were right but that the governments didn't implement them properly. In contrast, the Argentine government decided to eliminate his dependence on the IMF policies and refused to follow IMF advice.

As we can see in the Table.6, the macroeconomic performance of Argentina has improved since 2003. The growth rate of GDP increased to 9.2% in 2005. Per capita GDP has increased from 6455 dollars in 2003 to 7518 dollars in 2005. The balance on CA is positive and was passed from -9015.5 millions of dollars in 2000 to 8018.6 millions of dollars in 2003. The balance on CA as a % of GDP which was at -1.2 % in 2001, is realized at the level of 6.2 % in 2003.

We can conclude that the Argentine strategy, without IMF, that emphasizes rebuilding the economy with a view to delivering sustained growth with social inclusion - an appropriate objective in view of the high degree of poverty and inequality in the country. So, it would be correct to recognize that the first part of the economic recovery after the deep crisis in 2001 has been succesful in delivering strong growth with positive effects on the living standards of the population, especially the poor.



5. Comparative analysis and concluding remarks

We discussed in this paper the effectiveness of IMF-supported stabilization programmes throughout the cases of Turkey and Argentina. As indicated above, since the crises stroke both countries in the early 2000s, both countries are seemingly doing relatively well. They realized both the high growth rates and macroeconomic unstability seem to be over. But there is a crucial difference between two countries. Turkey, remained as a good student of the IMF, Turkish economy is still considered as a very fragile economy with the huge deficit of current account as we saw in the section related.

As a summary, we can argue that the IMF-supervised Programme in Turkey first of all aims at the repayment of debts. Indeed, tasks assigned by the Fund-programmes was to ensure macroeconomic stability along lines drawn by the World Bank (i.g. structural adjustment loans forwarded by the WB), IMF, and other international agencies as a whole dependent on international capital. So, what was meant by stability was to sustain the cycle of borrowing and repayment. This stabilisation measures programmed by the Fund are the direct result of this argument. The Turkish programme for "transition to a strong economy" developed in May 2001 as well as the macroeconomic objectives of ensuing "letters of Intent of IMF" focused on achieving primary budget surpluses equivalent to 6.5 % of NI to curb the debt cycle and restore the confidence of the markets. This target was maintained until 2007 with a new stand-by agreement.

In fact, Turkey and IMF staff announced at the end of 2004 a consensus on a new agreement covering the period of 2005-2007. There were three major preconditions to this agreement which contain some structural adjustments to the Turkish legislature for ratification. These are as follows: the social security draft that completely reshape the existing social security system; the draft on revenues administration which intends to maket he administration of revenues semi-autonomous from the Ministry of Finance; the financial services draft which will arrange the whole system of finance (www.treasury.gov.tr).

So, the approach of the financial support programmes of the IMF is "based on arrangements which are assumed to induce the confidence of international markets. Accordingly, Turkey now has to prove that it has a reliable and emerging market economy by following restrictive fiscal policies on the one hand and by giving effect o structural reforms to reshape her ties with international capital on the other"(www.bagimsizsosyalbilimciler.org)

It is important to argue that the different attitudes of two countries analyzed here are very clear. Argentina had chosen the independence in her economic policy whilest Turkey is continuing to follow the advices of the IMF which provides still financial support to sustain the repayment of the debts as we mentionned above. At this point, it is essential to formulate some policy suggestions for resolving the crucial problem of CAD without IMF supports and consequently regain a "status as a dignified member of the international community with a sound economy"as mentionned by some Turkish economists ((www.bagimsizsosyalbilimciler.org).



To do this, it should be noted the measures to take as follows:

Try to attract the foreign direct investments (see the Table 7 for comparing with the other countries attracting more FDI than Turkey) by reducing the unnecessary formalities discouraging them for decreasing the dependency to international capital; developing a new incentive system for supporting the industrial sectors giving more importance to invest in research and development activities for the technological advances; to reduce the costs of production as energy and telecommunication; increasing the labour and taxes, and some regulation related to product markets as the facilities to entry and exit the industry; and finally to develop the educational programme for increasing the quality of labour in order to increase the partial productivity. To continue to give the investment-incentives to the sectors of labour-intensif in which we compete with China and India that have the most cheapest labour in the world is not rational under the present conditions of international trade systems.

On the other side, Argentina, which has refused to follow IMF advices, has achieved the successful results as we explained before. Nevertheless, the persistence of sound macroeconomic policies in the future will be crucial to observe high growth rates of GDP in order to reduce the poverty which characterizes the Argentinean economy. But the example of Argentina showed that it is possible to adopt a strategy for the recovery by rejecting the IMF policies and its advices. That's because most Asian countries have also rejected today not only the IMF policies, but vowed never again to return to the Fund to borrow and have taken steps to avoid the financial crises in the future. Some other Latin American countries have also reduced or eliminated their dependence on these international institutions, like as Brazil.

DATA for Comparison

(**Sources:** IMF-IFS Yearbook 2004 and September 2005; The WB-World Development Report 2006; WB-World Development Indicators, 2005; WTO-International Statis.2004)

| | 0 0 | | / |
|-----------|------------------|------------------|--------------|
| | Population, 2004 | Av.annual growth | AREA (Th.of |
| | | (%),1990-2004 | sq.km), 2004 |
| Turkey | 71,3 | 1,7 | 779 |
| Argentina | 38,4 | 1,2 | 2 780 |
| Brazil | 183,9 | 1,7 | 8 547 |
| Mexico | 105,7 | 1,5 | 1 958 |
| EU-15 | 383,6 | 0,3 | 3 252 |

Population (Millions), Average annual growth of population (%) and Area, 2004.

Per capita GNP (or NI), At current prices, in US dollars)

| | 1980 | 1990 | 2000 | 2001 | 2002 | 2003 | 2004 |
|-----------|--------|---------|---------|---------|---------|---------|--------|
| Turkey | 1337,1 | 2697,1 | 2986,6 | 2109,6 | 2634,4 | 3390,0 | 4227,2 |
| Argentina | 5399,3 | 4274,7 | 7503,3 | 7005,2 | 2542,7 | 3206,1 | |
| Brazil | 1873,1 | 2976,5 | 3358,8 | 2773,4 | 2476,4 | 2689,1 | 3175,3 |
| Mexico | 2715,3 | 2950,7 | 5802,7 | 6125,0 | 6300,4 | 6121,8 | 6400,1 |
| EU-15 | 9980,0 | 18009,5 | 21095,7 | 21139,0 | 22954,7 | 27843,1 | |



| Orowin rate of Kear ODT (Annual percentage change, 70) | | | | | | | | | | |
|--|------|-------|-------|-------|--------|------|------|--|--|--|
| | 1990 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | | | |
| Turkey | 9,26 | -4,71 | 7,36 | -7,50 | 7,94 | 5,79 | 8,93 | | | |
| Argentina | | -3,39 | -0,79 | -4,41 | -10,89 | 8,84 | 8,89 | | | |
| Brazil | 0,43 | 0,81 | 4,36 | 1,31 | 1,93 | 1,93 | 1,93 | | | |
| Mexico | 5,06 | 3,76 | 6,59 | -0.03 | 0,77 | 1,44 | 4,24 | | | |

Growth rate of Real GDP (Annual percentage change, %)

Sectoral Distribution of GDP, (At purchases' prices), 2003

| | GDP in | Agriculture | Industry (% | of GDP: Value | Services (% of |
|-----------|---------------|-------------|-------------|---------------|----------------|
| | billions of | (% of GDP: | Added as % | of GDP) | GDP: Value |
| | dollars, 2003 | Value Added | | | Added as % of |
| | | as % of | | | GDP) |
| | | GDP) | Total | Manufacturing | |
| Turkey | 240,4 | 13 | 22 | 13 | 65 |
| Argentina | 129,6 | 11 | 35 | 24 | 54 |
| Brazil | 492,3 | 6 | 19 | 11 | 75 |
| Mexico | 626,1 | 4 | 26 | 18 | 70 |
| Portugal | 147,9 | 4 | 29 | 18 | 68 |
| EU-15 | 8.196,5 | 2 | 28 | 20 | 70 |

Structure of Manufacturing industry, (% of Total), 1990 and 2001

| | V. Added in | | Food, | Textiles | Machinery | Chemicals | Other | |
|-----------|---------------|--------|------------|----------|-----------|-----------|---------|---------|
| | manufacturing | | Beverages, | and and | | | manufac | cturing |
| | in billio | ons of | Tobacco | Clothing | transport | | | |
| | US \$ (at | | | | equip. | | | |
| | current | | | | | | | |
| | prices), | | | | | | | |
| | 1990 | 2001 | 1990 | 1990 | 1990 | 1990 | 1990 | 2001 |
| Turkey | 26,9 | 19,7 | 16,0 | 14,9 | 16,1 | 9,9 | 43,1 | 96,2 |
| Argentina | 37,9 | 43,2 | 19,6 | 10,4 | 12,8 | 11,7 | 45,5 | 54,4 |
| Brazil | 90,0 | 63,2 | 13,6 | 12,2 | 26,6 | | 47,5 | •• |
| Mexico | 50,0 | 110,4 | 21,6 | 4,8 | 24,2 | 17,6 | 31,8 | 28,3 |

Ratio of Gross Domestic Savings / GNP in percentage (%), 1990 and 1999-2004

| 8 | | | | | | | |
|-----------|------|------|------|------|------|------|------|
| | 1990 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
| Turkey | 21,3 | 13,6 | 15,1 | 12,8 | 18,9 | 19,1 | 20,4 |
| Argentina | | 13,9 | 14,6 | 14,5 | 21,0 | 20,6 | |
| Brazil | 15,2 | 15,7 | 17,6 | 17,1 | 18,7 | 20,5 | 23,4 |
| Mexico | 19,4 | 21,9 | 21,8 | 18,6 | 18,8 | 18,9 | 19,9 |



Brazil

Mexico

71,5

57,4

239,2

150,3

226,8

145,7

228,6

140,2

235,4

140,0

| Total External Debts (in billions of US dollars), 1980, 1990 and 1999-2005 | | | | | | | | | | |
|--|------|-------|-------|-------|-------|-------|-------|--|--|--|
| | 1980 | 1990 | 1999 | 2000 | 2001 | 2002 | 2003 | | | |
| Turkey | 19,1 | 49,9 | 102,2 | 117,3 | 113,4 | 131,2 | 145,7 | | | |
| Argentina | 27,2 | 62,23 | 145,8 | 147,5 | 154,1 | 150,0 | 166,2 | | | |

Total External Debts (in billions of US dollars), 1980, 1990 and 1999-2003

243,7

166,5

Total External Debts/GNP Ratio (in %), 1980, 1990 and 1999-2003

120,0

104,4

| | 1980 | 1990 | 1999 | 2000 | 2001 | 2002 | 2003 |
|-----------|------|------|------|------|------|-------|-------|
| Turkey | 26,6 | 32,5 | 55,0 | 58,4 | 78,9 | 72,0 | 61,1 |
| Argentina | 35,6 | 46,0 | 52,8 | 53,3 | 59,1 | 157,0 | 136,0 |
| Brazil | 31,5 | 26,7 | 47,1 | 41,0 | 46,4 | 51,6 | 49,6 |
| Mexico | 30,5 | 41,1 | 35,6 | 26,5 | 23,9 | 22,0 | 22,8 |

External Debt Service Ratio (in %), 1980, 1990 and 1999-2003

| = = = | | | | | | | | | | |
|-----------|------|------|-------|------|------|------|------|--|--|--|
| | 1980 | 1990 | 1999 | 2000 | 2001 | 2002 | 2003 | | | |
| Turkey | 28,0 | 29,4 | 35,4 | 35,4 | 40,0 | 46,5 | 38,5 | | | |
| Argentina | 37,3 | 37,0 | 75,4 | 70,8 | 42,9 | 16,6 | 37,9 | | | |
| Brazil | 63,3 | 22,2 | 117,8 | 93,5 | 75,5 | 68,9 | 63,8 | | | |
| Mexico | 44,4 | 20,7 | 22,3 | 30,3 | 25,6 | 22,7 | 20,9 | | | |

Note: This ratio is the total debt service payments to exports of goods and services including workers'remittances.

Central Government Domestic Debt, 2004

| | In billions of US dollars | Percent of GDP (%) | | |
|-----------|---------------------------|--------------------|--|--|
| Turkey | 152,6 | 51,04 | | |
| Argentina | | | | |
| Brazil | 162,80 | 26,93 | | |
| Mexico | 91,30 | 13,49 | | |

Merchandise exports (f.o.b.) and Merchandise imports (f.o.b.) and Current Account (CA) Balance, in billions of US dollars

| | Merch | andise ex | xports | Merch | andise ir | nports | CAB | alance | | Trade |
|---------|-------|-----------|--------|-------|-----------|--------|-------|--------|--------|------------|
| | 1999 | 2001 | 2003 | 1999 | 2001 | 2003 | 1999 | 2001 | 2003 | Balance,20 |
| | 2004 | | | 2004 | | | 2004 | | | 04 |
| Turkey | 28,8 | 34,4 | 51,2 | 39,3 | 38,9 | 65,2 | -1,3 | 3,4 | -8,0 - | -23,9 |
| | 67,9 | | | 90,9 | | | 15,5 | | | |
| Argenti | | | | | | | | | | |
| na | 23,3 | 26,5 | 29,6 | 24,1 | 19,2 | 13,1 | -11,9 | -3,3 | 7,7 | 13,2 |
| | 34,6 | | | 21,3 | | | 3,4 | | | |
| Brazil | 48,0 | 58,2 | 73,1 | 49,3 | 55,6 | 48,3 | -25,4 | -23,2 | 4.2 | 33,7 |
| | 96,5 | | | 62,8 | | | 11,7 | | | |
| Mexico | 136,4 | 166,1 | 164,8 | 142,0 | 168,4 | 170,5 | -13,9 | -17,3 | -6,5 | -8,8 |
| | 188 | | | 196,8 | | | -7,5 | | | |



Structure of Merchandise exports (f.o.b.) as a percentage (%) of total, 2003

| | Merch.Exp.(billions | Food | Agric.Raw | Fuels | Ores | Manufacturing |
|-----------|---------------------|--------|------------|--------|--------|---------------|
| | of dollars) | (% of | Mat. (% of | (% of | and | (% of total) |
| | | total) | total) | total) | Metals | |
| Turkey | 46,6 | 10 | 1 | 2 | 2 | 84 |
| Argentina | 29,4 | 50 | 2 | 17 | 3 | 27 |
| Brazil | 73,1 | 29 | 4 | 5 | 8 | 52 |
| Mexico | 165,4 | 6 | 1 | 11 | 1 | 81 |

Structure of Merchandise imports (c.i.f.) as a percentage (%) of total, 2003

| | Merch.Imp.(billions | Food | Agric.Raw | Fuels | Ores | Manufacturing |
|-----------|---------------------|--------|------------|--------|--------|---------------|
| | of dollars) | (% of | Mat. (% of | (% of | and | (% of total) |
| | | total) | total) | total) | Metals | |
| Turkey | 69,4 | 4 | 4 | 13 | 6 | 68 |
| Argentina | 13,8 | 5 | 2 | 5 | 3 | 84 |
| Brazil | 50,7 | 7 | 2 | 16 | 3 | 72 |
| Mexico | 178,5 | 7 | 2 | 3 | 2 | 86 |

Percentage changes in Consumer Prices (annual average changes); Interest rates (deposit rates); Growth rate of Reserve Money; Growth rate of Money supply-M2, 2004, in percentage (%).

| | Consumer | Interest rates | Growth rate of | Growth rate of |
|-----------|------------|----------------|----------------|----------------|
| | Prices (%) | (%) | Money supply | Reserve Money |
| | | | (M2) | (%) |
| Turkey | 8,6 | 22,1 | 23,73 | 31,63 |
| Argentina | 4,4 | 2,6 | 21,43 | 20,67 |
| Brazil | 6,6 | 15,4 | 19,37 | 10,77 |
| Mexico | 4,7 | 7,4 | 10,74 | 17,64 |

Annual changes in Exchange rates against the US Dollars* (in %), 1998-2004.

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|-----------|-------|-------|-------|-------|--------|-------|-------|
| Turkey | 71,72 | 60,58 | 49,37 | 96,08 | 23,03 | -0,62 | -4,87 |
| (Lira) | | | | | | | |
| Argentina | 0,00 | 0,00 | 0,00 | 0,00 | 206,48 | -5,31 | 0,78 |
| (Peso) | | | | | | | |
| Brazil | 7,70 | 56,33 | 0,83 | 28,85 | 23,88 | 5,34 | -4,94 |
| (Real)** | | | | | | | |
| Mexico | 15,38 | 4,65 | -1,10 | -1,20 | 3,36 | 11,73 | 4,61 |
| (New | | | | | | | |
| Peso) | | | | | | | |

Note: "-" sigh indicates appreciation.

(*) national currencies against/per US dollar as period average.

(**) Reais per thousand US dolar.



REFERENCES

Boughton, James M. (2004), "The IMF and the force of history: Ten events and ten ideas that have shaped the institution", WP, International Monetary Fund, Washington D.C., May.

Banerjee, A.; Duflo, E. (2003), "Inequality and Growth: Whay can the data say?", *Journal of Economic Growth* (8): 267-299.

Faucher, P.; Armijo, Leslie E. (2004), "Le role des institutions politiques dans les crises financières de l'Argentine et du Brésil", *Revue Tiers Monde*, Vol.XLV (178): 387-417.

Foreign Policy, September-October-November 2005: 73.

IMF (2004), International Financial Statistics Yearbook 2004.

IMD (2005), IMD World Competitiveness Yearbook 2005.

Koyuncu, Murat; Şenses, Fikret (2004), "Kısa dönem krizlerin sosyoekonomik etkileri", ERC Working Papers in economics 04/13, Ankara, METU.

Kibritçioğlu, Aykut; Rittenberg, Libby and Selçuk, F. (2002), Inflation and disinflation in Turkey, Ashgate, Hampshire.

Kohr, Martin (2006), "Reforms needed to IMF and the World Bank", Third World Network, Penang, September.

Lane, Timothy (2005), "Tensions in the role of the IMF and directions for reform", *World Economics*, Vol.6 (2).

OECD, Preliminary Outlook, Paris, 2006.

Ostry, Jonathan D. and Zettelmeyer, Jeromin (2005), "Strengthening IMF Crisis Prevention", WP, International Monetary Fund, Washington D.C., November.

Rossi, Marco and Rebucci, Alessandro (2004), "Measuring disinflation credibility in emerging markets: A Bayesian approach with an application to Turkey", WP, International Monetary Fund, Washington D.C., November.

Statistical Yearbook for Latin America and Caribbean 2005, www.eclac.org

Stiglitz, Joseph E. (2002), Globalization and its Discontents, W.W. Norton, New York.

Third World Network (2006), "Turkey and the IMF", Penang.

Unctad (2006), World Investment Report 2006.

Valdovinas, Carlos Fernandez (2005), "Growth, inequality and social equity in Argentina", WB en Breve, No. 82, November: 1-4.

World Bank (2005), "Argentina, seeking sustained growth and social equity", Report no.32553-AR.

World Bank (2006), The World Development Report 2006.

WTO (2004), International Statistics 2004.

Yeldan, Erinç (2005), "Dış borçların idaresi ve Arjantin dersleri", www.bagimsizsosyalbilimciler.org.tr, 19 January 2005.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



ANALYSIS OF THE RELATIONSHIP BETWEEN ECONOMIC GROWTH AND ENVIRONMENT IN TRNC

Hüseyin ÖZDEŞER

Department of Economics, Chairman EU Relations huseyinozdeser@yahoo.com

There is an important relationship between economic growth and environmental quality. The economic growth will not have an important positive impact in the country as long as the environmental quality doesn't improve in the same direction. When the economic growth and environmental quality improve together, then the economic development can be achieved. So, only one of them will not have any meaning for the societies. After the voting of Anan Plan in Turkish Republic of Northern Cyprus(TRNC), environmental problems became one of the most important issue of TRNC due to the developments in the construction sector. In the study, the importance of the economic growth and environment in the economic development will be analyzed. Specially, the environmental policies of TRNC in a more efficient structure.

INTRODUCTION

Human beings are faced with danger of the loss of the natural resources causing themselves to decrease everyday by the activitites and production facilities they impose. Those countries who have recognized the danger are taking measures to stop or minimize this danger. Education no doubt has the greatest influence in preventing this danger , in order to leave the best for the next generations. Those who do see the danger and hence still do not take measures are bound to see the worse. We, the TRNC public know these dangers and still do not take measures. The construction boom in recent years could be explained the heading pollution and harm to the evironment. Togher with this the production facilities have also increased to supply the inceased demand in the economy. But the fact is that the growing economy is affecting our nature in a bad way.

Increased popullation recently, have increased the number of cars in the traffic which again have increased the air pollution in the air. Growing popullation not only affects these but it also have effected the entertainment sector. Which in return have increased the noise pollution and the stress of people living around these areas. If foreign policies could be applied and professional help could be provided from abroad the growing effect of the economy may not be so bad as it is now. The purpose of this study is to compare and see the methods of the developed EU countries on the pollution factor and its effects on the economy.

The first section of the study explains the meaning of ecoomic growth and development, and what factors effect the growth and the necessary conditions for the development to occur. Second section is about the environmental problems of TRNC. It covers the general problems of the TRNC environment and the reasons for it.



Third section covers the relationship between economic growth and environmental quality together with the externality effects of orgaizations. Fourth section covers the solutions for the environmental problems in TRNC with the examples from the EU countries on how to make the best use of these resources and how. The last section cover conclusions and recommendations about the topic.

I.ECONOMIC GROWTH

Commonly economic growth is recognized as an increase in Gross Domestic Product (GDP) or Gross National Product (GNP); however it is a deceptive understanding of economic growth. Firstly, GNP is calculated in terms of money values so inflation will increase the value every year. Secondly, a change in real GDP does not signify the changes in economic welfare. Economic growth is further indicated by changes in real income per head so changes in GDP should be related to population changes. Relating growth to living standards we should include the composition of total output, by doing so would emphasize more on living standards.

The main question of economic growth is "How to increase output when all resources are fully employed?" doing so would increase the countries production potential. As a result, economic growth can only be measured among periods when use of resources, or rates of unemployment, were similar.

On the supply side; economic growth depends on the increase in the quantity and the quality of the factors of production and the efficiency with which they are used. On the demand side; increasing capacity and output depends on the level of aggregate demand; therefore, aggregate demand should be progressively increased to get to the desired rate of growth. (Stanlake, 1995: 358)

Generally; in the developing countries, the labor factor of production is relatively cheap, in order to increase the economic growth, these developing economies should still intensify the education and training for their labor force to make themselves more competitive.

Investment is recognized as an important factor in economic growth, and effectiveness of it depends on the type of investment. Although, no country has achieved a very fast growth rate without a high rate of investment, there are many countries who failed to experience growth when they invested heavily. Mainly, investment on public goods does not influence productive efficiency as much as manufacturing or commercial investments.

Distribution of labor force among different sectors influences the output per person. As a result of the economic growth, labor force shifts from agriculture to manufacturing and finally to service sector. Normally output per labor grows more rapidly in agriculture and manufacturing because influence of technology and production methods are heavier in these sectors, in service sectors it is more difficult to increase productivity because they depend basically on the persons ability instead of the process.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

Economic growth is the main goal of all economic policies because growth is the main contributor to higher standard of living. From peoples perspective; economic growth is desirable because it increases their living standards and life expectancies. From government's perspective economic growth is desirable too because growth increases the revenues from a given tax structure there for the government services would be better provided without unpopular tax increases. By maintaining the same labor force and working hour's people enjoys more consumption as a result of growth. Economic growth has some negative impacts on environment. As a result of industrialization pollution becomes more of a problem and natural resources diminish rapidly.

There are different views on the most effective way for developing countries to advance. One view is to increase primary productions. If developing countries emphasize on primary production their efficiency would increase for that product but a down side of this is that most of these products have inelastic demands and their price fluctuates rapidly in world markets so their economy would be fragile. Industrializing through import substitution is another way to advance developing countries and the goal is to establish a comparative advantage to protected industry. The downside to this is that domestic industries might rely heavily on governments support and not increase their efficiency. Promoting export –led growth accordingly competition in the international markets would generate income and promotes firms to increase efficiency and competitiveness. Main problem to this approach is that many countries have achieved lowest unit costs and they are protecting their own industries. Borrowing from abroad is another way to increase productivity. As a result of this strategy many developing countries got into debt problems. Relying on foreign aid is another strategy but the amount of aid given by first world countries is not sufficient enough for developing countries to improve their economies in to more competitive structure.

II.RELATIONSHIP BETWEEN ECONOMIC GROWTH AND ENVIRONMENTAL QUALITY

During the past decades air pollution (smoke and noise), municipal waste problems, loss of green areas, habitat destruction, threats to biodiversity, resource depletion, and the global green house problem seem to be associated to economic growth. Growing awareness of these problems raises questions as to whether economic growth is still desirable. On the other hand, economic development has formed richer and more productive economies which have access to more advanced levels of technological knowledge. Productivity per unit of natural resource use has increased, which allows, larger volumes of production at lower rates of environmental deprivation.

Technological progress and economic growth have created the opportunities and resources to finance investments in new environmentally friendly technologies, in order to solve waste problems and to reduce material and resource use. Economic activity may be the cause of the environmental problems, but also extinguishing the physical conditions might hinder economic development.



Environmental change and economic growth interact because of many links and feedbacks between two concepts. Firstly, environment is a sink for wastes and, secondly, a source of resources for the economies. Thirdly, society may have a preference for a clean environment, because environmental quality has an amenity value or an existence value. Fourthly, a clean environment boosts productivity of production factors so that it has a productive value. Finally, part of economic activity may be directly devoted to cleaning up spoilt parts of the environment, that is, abatement and recycling may take place.

The supply, demand, and market institutions determines at what rate natural resources are used for production, how much pollution is generated in the economy, and how much of total output in the economy is used for investment. Natural resource use and pollution affect the environment; investment creates new capital inputs for future use and thus creates opportunities for economic growth.

Ecological considerations determines how exactly resource use and pollution effect the environment. A change in environmental quality is subject to complex processes that in general takes place gradually over time. Therefore, it is useful to see environment as a renewable natural resource stock that may grow or decline over time, depending on whether the use of resources falls short or exceeds the natural growth of the resource. (Scholz and Ziemes, 1999:20)

There are two types of investments that generate economic growth and increased environmental quality over time. First is to invest in physical capital which would increase the production therefore generating growth in economies. Second is limiting both pollution and use of natural resources, and as result environmental quality improves. These two investments determine the interaction between economic development and environmental quality. Concept of externality should be considered when making economic decisions. Externality takes place when a decision produces costs or benefits to a party that is not reflected in market prices. There are two types of externality that is positive and negative externality. When an externality is positive some parties actions creates external benefit to other parties. An example to positive externality could be education and someone's beautiful garden which is visible to others that would look nice to everyone. Negative externality is a problem when making environmental decisions. In negative externality the decision maker does not carry all the costs of their action and therefore generates more returns than a free market would produce. An example to negative externality is pollution created by someone's production generates harm and nuisance to others and if the producer does not clean up all the wastes the third parties will bear the costs there fore market prices would not reflect all the costs. Externality is an important concept in economics because it may lead to economic inefficiencies.



III.ENVIRONMENTAL PROBLEMS in TRNC

After the rejection of Annan Plan by Greek Cypriots in the Referandum on 24th of April 2004, there's an incredible boom in the construction sector in Northern Cyprus. As an effect of this boom The Five Finger Mountains have started to become an disturbed and ruined plus the surrounding environment around it covering the traditional tress such as the olive trees also to be destroyed.

As the construction sector experienced a boom the population of TRNC have also increased. This especially effected the entertainment sector during the summer season. The late opened discos have been creating noise pollution, disturbing the neighbourhood around the area. As people cannot get enough sleep, they have tended to be unsuccessful at their job and being distressed at home towards their families as a result of this. So the families in general have been effected through this boom in the entertainment sector.

Followed by these problems arose the so long problem of the 'Dikmen Dump Area'. In recent time in TRNC people were complaining about the smoke coming from the Dikmen Dump Area. This hazardous smoke covered the whole Dikmen and Nicosia areas preventing people to smoke properly. This is a serious problem that could give rise to health problems. Many projects have been submitted to the public during the election period in TRNC. But not any changes have been made yet! The given promises have not been kept.

Water pollution have also began in TRNC-mainly due to the following factors:

1.inrease in the population
2.urbanisation
3.industrialisation
4.agricultural contention drugs and chemical manure

Increase in popullation especially in the cities is the result of the industrialistion in these areas. Increasing consumption levels increases the amount of dump in the Dikmen Dump Area, causing more air pollution. And increased (industrialisation due increasing demand) have created the water pollution by dumping their chemicals into sea.

The four named factors above effect the environment in TRNC in general. But other factors affecting the water pollution can be named as: drained water (flowing in the streets and in the streams instead of fresh water!) and petrol leakage into sea.

During fuel transfer at Teknecik Power Plant of the Turkish Republic of Northern Cyprus (TRNC), about one ton of fuel leaked into the sea due to a glitched which occured in the pipes. Cyprus Turk Electricity Institution announced that the accident took place while transferring fuel from a ship which was carrying 25,000 tons of fuel to the fuel tanks.

The transfer was stopped as soon as the leakage was recognized. Teknecik, personnel and the people living in the area have worked to clean the leak. (www.domecasino.com)

Teknecik Electric Power Plant is close to Alagadi coast which hosts caretta caretta sea turtles. Caretta carettas which are facing extinction have been taken under protection all over the world.



In 1974 less than 1/5 of the current Turkish-occupied territory of the Republic of Cyprus was owned by persons other than members of the Greek Cypriot community and the Cypriot state. Specifically, according to data that cannot be disputed, prepared both under British rule and since independece, (the 1964 Land and Registry record), Greek Cypriots owned approximately 78,37% of the privately owned land in the territory now under Turkish occupation, while persons belonging to the Turkish Cypriot community owned approximately 21,31% . In terms of the total area under Turkish military control, 60,27% belonged to Greek Cypriots, 16,39% to Turkish Cypriots, 0,24% to other private individuals and 23,09% to the State.

Following the Turkish troop movement of 1974, the forced eviction of approximately 170,000 Greek Cypriots from their ancestral homes, and the illegal occupation of 36.4% of the Republic of Cyprus' territory, the Turkish occupation regime placed the properties of dispossessed owners at the disposal of its own 'authorities', the Turkish military and ordinary Turkish Cypriots. After the commencement of Turkey's organized colonization of occupied Cyprus in late 1974 many such properties were handed over to Turkish mainland settlers. The distribution of properties was also used by the Turkish Cypriot leadership to 'buy off' political influence both within their community and within foreign circles.

As verified in the European Court of Human Rights Judgements, despite the illegal acts of the occupying power, the Greek Cypriot displaced owners have not lost title to their property under international and national law. Turkey has since 1974 been in continuing violation of the rights of the displaced owners to property and home.

The year 2002 witnessed the confluence of two phenomena, which generated an unprecedented, unethical and illegal 'sales' and construction boom in the occupied territories.

Exploitation in Figures:

In 2002 foreigners purchased 63,000 sq.m In 2002, 290,000 sq.m In 2003, 613,000 sq.m In 2004, 116,000 sq.m in the first 6 months of the year. 1.000.000 sq.m. of land were sold during the last 3.5 years alone in occupied Kyrenia.

In 2004 alone, more land was sold to foreigners than in the 30 preceding years. That is, while for thirty years (1974-2003) foreigners bought only 2.600 donums of land in the occupied area, in 2004 alone they bought 2.827 donums of land. (Turkish Cypriot daily KIBRIS,27.11.05)

This is primarily reflected in the increase of imports of construction material. The imports of building bricks, for example, increased by 3,114%, the imports of cement by 262%, the imports of iron by 219% and the imports of stones by 585%. At the same time, while the average daily production at the stone quarries was five thousand tones, in 2004 this production increased to twelve tones daily.



In the year 2000 an area of 607,000 sq.m. was built-up in the TRNC, while in the year 2005 an area of 4,400,000 sq.m. was built-up in occupied Cyprus. Taking into consideration the average figures as regards the development in the construction sector, the advancement during the last four years has reached a point that it should normally have been reached in 9 years time, that is, in the year 2015. (Turkish Cypriot daily YENI DÜZEN newspaper, 08.05.06)

IV.SOLUTIONS for the ENVIRONMENTAL PROBLEMS in TRNC

Water is one of the most important resource we need to have in order to continue to be alive. And as known 'water' resources are very scarce in TRNC and most of them are becoming salty in the recent years, as it started to mix with the sea water as a result of declining water springs. These resources could be protected: by protecting damping liquid or solid churn especially in summer seasons where all the streams and lakes become dry, which would also protect the environment becoming polluted as well as the water pollution.

Strict rules should be applied during long and hot summer seasons. For example: washing cars from the main water tabs should be prohibited (like in the Great Britain) and those caught should pay a fine. By this way water consumption during dry summer season could be minimized. And in agriculture sectors, rather than over using water to water the plants, plant types should be chosen according to the water resources, which would require less water to grow. So with this farmers could mimize their loss and save more water. The sewage systems should be built throughout the whole TRNC. By this way we could stop the lose of clean water and collect in a artificial reservoir where they could be collected and treated over for re-use. (for example: the Canada- applies this under sewage treatment plant). This is the example way which the UK applies to prevent loss of water – in another words it is called the *water cycle*, where water is purified again.

What happens in a water purification plant:

First there must be a source of water nearby. This could be a river or lake, or it could be a reservoir created by the building of a dam to hold the water back. As this water is needed, it is carried by pipes into a purification plant where it is made safe for drinking by going through the following treatments:

First of all water is sprayed into the air where it mixes with oxygen. This step is called *aeration*. The oxygen helps bacteria grow which in turn destroy some of the impurities.

The next step is *coagulation* where *alum* is added to the water. Alum forms sticky particles to which dirt and other particles cling.

In the next stage, *sedimentation*, these impurities settle to the bottom of a settling tank.

The water then goes to a filter tank where *filtration* occurs. Any impurities left in the water are filtered out through layers of sand, charcoal, and gravel.

In many communities, *chlorine* is added to the water to destroy and disease-causing germs that may remain; and in more and more communities, fluoride is added.

When water has gone through these steps, it is ready for use. The clean water is pumped to large storage tanks and from there it is pumped into pipes that carry it to your homes, schools, businesses and industries.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

Wastes can be easily removed from the majority of our homes by just turning on the tap and washing. This water then goes into the sewage system through these steps:

Primary treatment- sand, grit, and other solids are separated from the liquids by screens and settling tanks.

Secondary treatment- air is added (aeration) to stimulate the growth of bacteria to consume most of the remaining waste materials.

Tertiary or advanced treatment- chemicals are added which remove nutrients that stimulate algae (tiny plants that use up oxygen needed by fish).

Typical sewage treatment process in Canadian municipalities.

Increasing popullations result in more air pollution due to the increased amount of cars used in traffic meaning more CO2 in the air. And during the cold winter season more fireplaces work either with woods or coal. The United Kingdom had decreased the carbon dioxide (CO2) emissions by 20 per cent during the period covering 1970-2002, particularly since the early 1990's mainly because of the swith from the use of coal and oil to gas and nuclear power in power stations. The gas coming out from the chimneys, car exhausts, factory chimneys (especially from the Teknecik power station) have been polluting the air in TRNC.

The long electricity problem of the TRNC, not only prevents economic activities, but it also pulls back people in participating any activities. The power problem arises from the Teknecik, which is insufficient in supplying the general power demand to the citizens.

It is a shame that this island has all the necessary things to generate energy and still cannot do anything about this subject. France and Canada for example, have been successful in providing energy through tides and waves. By building tidal barrage (which is very much alike the hydroelectric power plants) which still destroys environment in a way, but have been successful since the eleventh century in Great Britain. A barrage is built across an estuary . Gates and turbines are installed at regular intervals along the barrage which are opened when there is significant difference in water elevation on either side of the barrage. Water flows through the turbines and electricity is produced. This method can be used for water flowing both into and out of the estuary. It shouldnt be forgotten that the local geography and marine ecosystem is important in applying this system.

A farmer in Germany produces electricity through the animal excrements. This method keeps the nature system in balance. This energy (biogas) is created through the animals and the droppings from the animals fall into the space below the floor, flow into the hole and then into the septic tank. The animal excrements are transformed in the septic tank by micro organizms which produce methane gas and a high quality, low smell fertiliser. (www.tve.org)


V.THE NEGATIVE IMPACTS of ENVIRONMENTAL PROBLEMS on TOURISM SECTOR in TRNC

To improve the tourism sector in TRNC, we must take some measures to succeed this aim to achieve positive gains from the tourism sector to economy.

The visional disorder caused by the disruption of the environment, the five finger mountains for example have been spoilt with construction activities to provide the necessary gravel and sand. The long known environment of the five finger mountains is about to vanish. And no one or no authority is taking any actions towards this. Whereas the foreigners are coming to see the natural beauty of this island. In future they wouldnt be able to see the five finger mountains but single finger mountain!

The Dikmen Dump Area is also causing visional disorder, spreading around bad smell and smoke. Which effects the foreigners thinking theres fire. It gives the environment a poor look, so under development vision. This area could be turned into an establishment, which provides electricity for example. By this way the dirt and the bad smell could be removed. The noise pollution in TRNC not only affects the tourism sector but the native people too. The long problem of power and the electricity cuts causes people to turn their jenerators on withouth thinking the negative impacts that it provides to their environments. Additional to this, theres the loud music from the open-air discos, which affects the customers in hotels keeping them away from their sleep and the local people who live around these discos are also effected. The government may restrict play of the time of loud music, by this way the young tourists can still have fun and the older ones can have rest at the same time. There is this restrict in time but it needs more tight inspection.

The air pollution affects the natural nature and the people living in TRNC. The bad smoke arising from the car exhausts and from the factor chimneys could be prevented by filter sanctions. These should be inspected and fine should be applied on those people who do not obey.

The bad drain smell arising from the Haspolat area should be removed too. It prevents those people passing from there of taking breath of fresh air. The sewerage system should be provided in the infrastructure to prevent this.



VI. RECOMMENDATIONS and CONCLUSIONS

The natural resources in TRNC should be protected before they become very scarce. We could not stop people damping their bins into lakes, causing the water and the environment to become polluted, but rather people themselves should recognize the importance of this latter.

The water cycle is an important subject that TRNC should focus on, but the budget may not be enough for this project. Most developed countries use this method to recreate water in use and it works perfect. A profession help in one of the developed countries could be asked in creating this project and make the necessary moves. By this way TRNC would not be dependent upon any other countries in providing water.

The government could make the best use of the temperature (which is found in plenty) in creating energy. A professional help in this project from those country that use this method would only cost very low when compared with the whole project. Especially during the long, dry and hot summer this method of creating energy from temperature should be applied, the weight on the Teknecik power plant could be reduced and eased untill that to becomes renewed when the budget becomes satisfactory. The animal excrements is also a low cost and effective way to create power which also could be used in TRNC. Most of the popullation especially in rural areas have animals to some extent and farms as well. Government could announce an amount of money per ton of these excrements in order to enable people to transform the animal exrements or the government again could have special trucks dealing with these excrements and collecting them in the project area to be transformed into power resource.

All the animal excrements are either used for agricultural purposes or they are thrown away in TRNC not knowing the benefits that it could generate and lower their expenses.

Developing the Dikmen Dump Area is an important point too. Because the smoke arising from this area not only gives harm to human health living around but it also creates air pollution giving harm to the ozone layer. Special filters could be applied to minimize the harmful effect of smoke. But like other developed countries, TRNC should learn the culture of separating in type of the bin from each other. For example: paper could be collected separately by putting special paper tanks around the island and these could be recycled and used again. Glass tank would do the same job by collecting the glass bottles separately from other bin, which again would be recycled again.



During the winter seasons filters should be put in the house chimneys that prefer to use the fireplace. But again like other developed countries the use of wood, or coal should be minimized and new approaches to using gas should be created (this would cover the next period of 20-25 years to be fully covered) these filters should also be applied to car exhausts and to the chimneys of the factories too. They all should be inspected and a fine should be applied on persons who dont obey this rule. For example: the production facilities could be lowered as a fine or fine could take the form of high amount of money to those factories who do not follow this rule.

REFERENCES

FOLMER, GABEL: 'principles of environmental and resource economics',2000 http://cyprusmirror.com http://www.ec.gc.ca http://www.ecocentre.org.uk http://en.wikipedia.org http://halkinsesi.org http://news.pseka.net http://www.columbia.edu http://www.csmonitor.com http://www.defra.gov.uk http://www.domecasino.com http://www.dzforum.de http://www.idrc.ca http://www.kibris.net http://www.kibrisgazetesi.com http://www.photius.com http://www.wasteonline.org.uk http://www.waterencyclopedia.com STANLAKE, GRANT; 'Introductory Economics', 6th edition, 1995





ENVIRONMENTAL DIMENSIONS IN DEVELOPING NEWLY RECLAIMED DESERT LANDS

Salah Y. Awad ALLA *

Desert Research Center DRC Matariya, Cairo, Egypt, ARE. syaw2410@hotmail.com

The global expression of **"Environment** "is nowadays involving almost all items those related to human life as the main target for any environmental improvement. The proposed system of World Bank (WB) in 2005 for assessment of 5 main headlines with 28 indices with about 76 characters had been adopted on large scale for about 150 regions. Egypt, as one of these studied regions, ranked in so late order which we can attribute that to the following reasons:

1- The majority of desert area allover the region with about 96 % (~ 965,000,000 km 2) so the so-called "desert character "control many of life style parameters.

2- The population growth impact (~ 2.2 % /year) in front of lower rate of suitable lands for agriculture (~ 1.4 % / year) which shrink the cultivated land per capita progressively.

3-The environmental impact of increasing consumption more than production especially for agricultural commodities.

4-The environmental impact of refused organic wastes especially in-farm ones than the recycled amount into beneficial forms (\sim 4- 5 % only recycled).

5-The dramatic expansion of using agrochemicals for upraising the agriculture production and also dense cultivation as reached to \sim 3 times / year in some locations.

6-The gradual increase of water resources consumption which in turn decline the amount of water per capita (~ 630 m 3 / year / person) .

7-The high costs of agricultural production in desert than old areas which impact on the economic situations of the farmers in these areas, so their settlement.

8-Habhazardeous selection of crop pattern in these locations (Rice and Banana in some areas dependant on groundwater).

9-Risks of wind and water erosion in many regions due to the so-called "desert character".

On the other hand, there are many of efforts those directed to improve some or even all these stresses through adopting some new complemented approaches for avoiding or eliminating the deterioration of these locations. The lecture will spot light on some of these activities.



A Bio Organic Farming Systems (BOFS)

These techniques had been generated , tested and adopted along about 15 years in many locations . It involves many approaches which tackled with almost all items those proposed by WB as ESI (Environmental Sustainable Indices). They beginning from the beneficial use of any existed organic wastes (normal or Abnormal) by some biotechniques in producing high fertilized Bio-organic manures which improve the characters of both soil & plant as well ,so improving human & animal health . Therefore, many environmental parameters had been improved through adopting these systems in many locations. The tackled items of ESI by these systems reached to 26 from the 28 ones by different categories.

B- Rising the Water Use Efficiency (WUE)

There are many techniques which adopted to benefit from the limited source of water in these locations which include:

1-Rainfall harvesting.

2-Mulching of top soil to prevent evaporation.

3-Beneficial use of saline waters.

4-Improving the modern irrigation micro-techniques as to minimize water consumption to lowest levels.

5-Using sub-surface irrigation methods.

6-Using of near subsurface waters.

The tackled ESI items by these techniques reached to 23 from the 28 ones by different categories.

C- Adjusting the crop pattern

There are many efforts to adjust the crop pattern in desert lands especially these locations suffered from shrinking their water resources supplies The Case study of New Valley Report (2004) tackled with 23 items from the 28 ones of ESI.

Finally, it seems possible to improve the Environmental scoring of desert locations by adopting such of these techniques in sustainable manner.

Introduction :

The global interest with desertification problems and hazards may be old as far as the human life on the earth with population expansion and exhausting of the traditional land resources by dense agricultural activities. But, may be the International Conference on desertification at Nairobi 1977 is the first well organized action in this concern. It held for the following reasons:

- 1- Shrinking of Chad Lake to $\sim \frac{1}{3}$ its original size.
- 2- Unloading of Niger & Sing Hal Rivers.
- 3- Dryness of many wells.
- 4- Disappearance of great areas of plant covers under overgrazing hazards.
- 5- Growing of great desert areas.



So, the important findings of this conference were:

- A- $\frac{1}{3}$ of the universe is desert and semi-deserts.
- B- 15 % of human population habitats in this area.
- C- Human misuse of lands adds to this portion ~ 10 %, so the desert lands reached to ~ 43 % of the global area.

The reasons were reviewed as following:

- a- Declining or overusing of water resources.
- b- Misuse of soil management practices.
- c- Unsuitable crops for given lands.
- d- Exhausting soil by dense cropping without proper fertility compensation.
- e- Soil salinity hazards.
- f- Missing of human professionalism.
- g- Human migration due political circumstances.
- h- Overlapping of manufacturer & habitat ional activities on agricultural lands.
- i- Competition among cultivation return and other kinds of investments.

The other global expression which aroused through the last 3 decades is "ENVIRONMENT", as a return of the following stresses:

- 1- Fresh rivers pollution.
- 2- Misuse of agrochemicals allover the world.
- 3- Air pollution problems especially those aroused from wastes burning.
- 4- Soil pollution problems due to many sources; irrig. Water, agrochemicals, hazardous use of abnormal manures (sludge, town refuses ...).
- 5- Crops pollution with different contaminants and their effect on human & animal & poultry health.
- 6- Global sources of pollution; e.g. nuclear dust, ozone hole, shipping wastes, acidic rains

In this concern, two major trends have to be considered:

- A- The general aspect when measuring the effect of any environmental item and its weight is how much it "add to" or" subtract from" the whole ENVIRONMENTAL SCORE.
- B- The general concept of development is to; EITHER adds more positive environmental aspects to the already existed ones OR converting negative to positive aspect .

Environmental Sustainability indexes of World Bank (2005)

As to measure digitally the Environmental situation of any given area the World Bank WB achieved a system for collecting definite scores for 75 specific items which grouped into 28 parameters. These parameters identify 5 main disciplines as following:

- 1- **SYSTEMS** with 9 parameters.
- 2- STRESSES " 7
- 3- HUMAN VULNERABILITY with 4 parameters.
- 4- SOCIAL & INSTITUTIONAL CAPACITY with 4 parameters.
- 5- GLOBAL STEWARDSHIPS " 4 "



So, depending on the existed data in each country they collected scores for 146 countries all over the world. Egypt, as our case took 44 general score and had the rank of, 115th, in this group. We believe that the reasons for this tragedy situation are for the following aspects:

1- The majority of desert area allover the region with about 96 % (\sim 965,000,000 km 2) so the so-called " desert character " control many of life style parameters .

2- The population growth impact (~ 2.2 % /year) in front of lower rate of suitable lands for agriculture (~ 1.4 % / year) which shrink the cultivated land per capita progressively. 3-The impact of increasing consumption than production especially for agricultural commodities.

4-The environmental impact of refused organic wastes especially in-farm ones than the recycled amount into beneficial forms (\sim 4- 5 % only recycled).

5-The dramatic expansion of using agrochemicals for upraising the agriculture production and also dense cultivation as reached to \sim 3 times / year in some locations.

6-The gradual increase of water resources consumption which in turn decline the amount of water per capita (~ 630 m 3 / year / person).

7-The high costs of agric. production in desert areas than the old ones which impact on the economic situations of farmers in these areas, so their settlement.

8-Habhazardeous selection of crop pattern in locations depended on ground water resources.

9-Dangerous case of wind and water erosion in many regions.

On the other hand, the efforts to convert the scoring of these parameters are numerous, but considering the previous aspects the whole salvation for this problem needs further great efforts. This article will declare some of the existed efforts of DRC, as partially responsible for changing this situation. The main characters of all these efforts are integration & complementation as with apparently unique approach can achieve many goals in improving the environmental parameters. Some of these efforts are:

- 1- Modern Bio-Organic Farming Systems.
- 2- Improving of Water Use Efficiency (WUE) of crops.
- 3- Improving of crop patterns aiming to water saving.
- 4- Combating Wind& Water erosion hazards.

Bio-organic Farming Systems :

These techniques had been generated, tested and adopted along about 20 years in many locations. They involve many approaches which tackled with almost all items those proposed by WB as ESI. They beginning from the beneficial use of any existed organic wastes (normal or Abnormal) by some biotechniques in producing high fertilized Bio-organic manures which improve the characters of both soil & plant as well, so improving human & animal health. Therefore, many environmental parameters had been improved through adopting these systems in many locations. The tackled items of ESI by these systems reached to 26 from the 28 ones by different categories.



A- What are the main problems in old and new soils?

They are mainly; Structure less, Salinity, Alkalinity, Pollution, Compaction, so low productivity.

B- What is the role of organic matter in soil?

C-

a-It is the natural environment for biological activity.
b-Holding soil water, So nutrients.
c-Holding energy as soil heat for different reactions;
Physical (water movement)
-Chemical (all reactions)
-Biological (microbial proliferation & activity).

C- What are the sources of organic matter ?

a) Agriculture wastes.

The unused amounts in *Egypt* yielded to about 35 million Ton/Y and increased, which mainly burned. Its value equals to \sim 3.LE billions.

b) Kitchen wastes (Town refuses).

The unused amounts reached to ≥ 12 million Ton/Y and increased (≥ 19 million at 2010). Its value equals to ≥ 1 LE billion.

c) Sludge wastes (Treated or not).

The unused amounts reached to ≥ 3 million Ton/Y and increased.

Its value equals to \geq .5 LE billion.

d) Farmyard manures The unused amounts reached to $\simeq 0.6$ million Ton/Y. Its value equals to $\sim .1$ LE billion.

So, the total loss in these sources equal to ~ 4.6 LE billion/Yr.

So, the expected question why these amounts are unused?

• In fact, there're some reasons :

+ Easy way of using agrochemicals, spec. Fertilizers.

- + Absence of agric. dissemination in this field.
- + Scaring from pollution, esp. from sludge and town refuses.
- + Big investments needed to establish the enough units of recycling.
- + Scattering of wastes all over the cultivated area.

D- What Can we do?

The unique solution for all is

Modern Bio-Organic Farming Technique {S};



Modern New applied approach.

Bio -- Natural beneficial microbes isolated and activated in laboratory.

Organic Natural organic sources; i.e. Crop wastes, Cow manure, Sawdust, Sludge cakes, kitchen wastes etc.

Farming Techniques A technique which farmers can be apply by themselves in their own farms with few external supports.

The modern bio-technique of composting consists of the following steps:

A) Semi-anaerobic step:

By crushing, arranging in layers consists of wastes and chemical fertilizers (1%) and initiator as farmyards or even sludge (2%) and damped with enough water and some decomposing bacterial strains for about 2-3 weeks.

B) Aerobic step:

By turning of the compost every 2 weeks and adding some biofertilizers to enrich the compost, water is just enough to moist the compost up to maturity.

Sludge could be used in compost as:

- it will be diluted in composting for its heavy metals components.
- It will be secured for its pathogenic components by first semi-anaerobic step.
- Its high O.M. and N content enhance greatly the microbial activity as whole.

E-How to apply ?

a) **Dissemination** through seminars, meetings and questionnaires as to get the public Coordination in the application.

b) **Field application** for making Compost in different sizes in houses, fields and big ones.

• When discussing the composting process we explain it as cocking way which differs up to kind of wastes, the existed materials, experience, financials, the cultivated crop, soil status.

c) Cumulative activities

I- Physical, as crushing with labors, machines or tractors to enhance surface area.

II- **Chemical** by add chemical fertilizers by adjusted doses up to waste kind, crop and soil status. (Average ~ 1% w.w.).

It is preferred to add the natural sources of fertilizers, such as rock phosphate as to minimize the casts. In all cases water with excess amount is urgent so closing the compost for 2-3 weeks. In this step all hard materials decomposed and all pathogenic, grass seeds, insects died due to increasing heat with anaerobic conditions.



III-**Biological** by enriching the compost with beneficial biofertilizers like N - fixation, P diss. B., K diss. B., (1-2 liter/ton) with turning every 2 weeks up to maturity.

The main features of maturing are;

- A- Fine texture
- B- Dust smell
- C-Brownish color
- D- Homogeny

E- Earthworms population

Time of maturity ranged between 2-4 months

Bio-organic techniques also mean;

A-**Biofertilization** through biological treatment of seeds and vegetative growth periods. It could be alone depending on the residual organic matter existed in soil, which is suitable, may be, for old alluvial lands.

B- Complemented technique by biofertilization as above engaged with soil treating with fertilized compost which is:

Organic – Chemical - Biological compost

which is mainly suitable for new desert lands.

F- What are the gains?

a- Economical:

- 1- Wheat about 8.7 Tons/Hectare
- 2- Corn (zee maize) about 13 Tons/Hectare
- 3- Sorghum (fodder) about 200 Tons/Hectare
- 4- Potato about 25 Tons/Hectare (for exportation)
- 5- Alfalfa about 350 Tons/Hectare (green fodder).

6- Cumin about 25 Tons/Hectare. These values yield almost an average of 2-3 thousands EL/Ht.

- 7- Special projects for producing compost with net gain of 2-3 LE/1 LE investment.
- 8- Minimizing of agrochemicals abuses by at least 25%.

b- Environmental:

- 1- Cleaning of farms from wastes.
- 2- Stopping the burning of wastes, so cleaning air.
- 3- Improving the healthy status of either urban or rural sites.
- 4- Producing organic crops.
- 5- Improving the human manner due to clean environment and getting financial gains.

c- Natural resources

1- Improving soil properties; physical, chemical and biological.

2- Buffering soil chemical status in saline soils, so the salinity hazards on plants minimized.



3- Reclaiming new areas with cheap and sustainable resources of wastes.

4- Saving irrigation water by increasing the holding soil capacity for water (at least 10% saving).

5- Reserving air from pollutants.

6- Improving the soil salinity status specs. That resulted from abusing agrochemicals.

G- What is the future vision?

*Biological center

For producing different microbial strains adopted for desert soils (sandy, calcareous, salty...) and conditions (drought, salinity...) and crops (orchards, vegetables, cereals, oil crops, fodders, ornamentals, medical....) about 30.000 dose/yr.

*Compost center

For producing bio-organic fertilized compost about 10.000 Ton/yr.

* Dissemination & Training courses

A plan for Bio-organic techniques application in desert lands.

2- Improving of Water Use Efficiency WUE

Water Use Efficiency means simply how much the net return of Water unit (e.g. Ton or Kg/m3)

Different methods of increasing WUE: a- Selecting of irrigation method

To choose an irrigation method, depends mainly on the following factors:

1- natural conditions: such as soil type, slope, climate, water quality and availability.

- 2- Type of crop.
- 3- Type of technology.
- 4- Previous experience with irrigation.
- 5- Required labor inputs.
- 6- Costs and benefits. When to Use Irrigation Systems:

Surface irrigation : 1- Basin :

Crops: Many field crops. Paddy rice, - Pastures, e.g. alfalfa, clover;

- Trees, e.g. citrus, banana;
- Crops which are broadcast, such as cereals;
- To some extent row crops such as tobacco.

Not suited: Root and tuber crops such as: potatoes, cassava, beet and carrots.

Land slopes: Flat land.

Soils type: Clays, loamy.

Not recommended: Course sand, hard crust. :



Surface irrigation : 2- Furrow :

Crops:Row crops such as: maize, sunflower, sugarcane, and soybean; Crops that would be damaged by inundation, such as tomatoes, vegetables, potatoes, beans;

- Fruit trees such as citrus, grape;

- Broadcast crops (corrugation method) such as wheat.

-Land slopes: 0.05 to 0.5% does not exceed 3%.

Soil types; Sandy to Clay soils.

. - Not recommended for very coarse sands.

Surface irrigation : 3-Border:

Crops: Close growing crops such as pasture or alfalfa are preferred. Land slopes: 0.05 to 2.0 %.

Soils type: Deep homogenous loam or clay with medium infiltration rates.

Sprinkler irrigation :

Crops: Most row, field and tree crops. Not suited: Delicate crops such as: lettuce. Land slopes: Adaptable to any farmable, slope laid out along the land contour. Soils type: Sandy, Water application rate less than the basic infiltration rate. Not recommended: Soils which easily form a crust.

Drip irrigation :

Crops: Row crops Vegetables, small fruits like strawberry and Orchards Generally valuable crops or cash crops. Land slopes: Slightly undulated slopes while laterals could be laid along the contour lines. Soils type: Most soils: Heavy and Light soils.

- b- Minimizing of transpiration :
- + Using of Antitranspirants like monomolecule alcohols.
- + Watering through night time especially in summer.
- + Hoeing several times as to corrupt water films to soil surface.
- + Using wind brakes to minimize wind effect.
- + Using some species have minimum transpiration rates.
- + Increasing the moisture depletion level in establishing irrigation schedules.

c- Increasing soil moisture storage capacity:.

+ Sustainable addition of Organic amendments to soil.



- + Using different soil synthetic conditioners.
- + Mulching techniques.
- d- Rainfall harvesting.
- e- Clay pots.

Advantages :

1- Saving ~ 70% of irrigation water compared with surface and 30 % of drip irrigation methods.

2-Suitable for areas with no energy source.

3-Its long-term costs is minimum comparing to any other method.

4-Do not need to specific talent to use.

5-Moisture distribution is perfect.

6-No surface runoff or deep percolation of water.

3- Improving of crop patterns aiming to water saving. Case study of New Valley Governorate (36% of Egypt area)

A-Basic Information's :

- Problems of irrigation water shortage from many owners.
- Insuring of irrigation managers with water sufficiency as planned since 45 years ago.
- Using of surface irrigation system in the whole area.
- Some scattered information about depletion of ground water levels and inner pressures in some deep wells.
- Ultimate dependence of agriculture in the region on natural and artificial wells.
- Some reports on cultivation over the well loads (i.e., overloaded cultivation).
- Irrigation requirements were at two levels; i.e. low with 14 m3/fed/day from Dec. up to Feb., and high with 30 m3/fed/day from Mars up to Nov.
- Cultivation of some highly water consumable crops (Rice, Sugar cane and Alfalfa) in hazardous distribution.

B- Investigation directions:

- Field visit to record the actual situation.
- Collect the Agro meteorological data for :
 - a-Recent 2 years.
 - b- 30 years from Atlas.
 - c- Collect all the studies about soils of the whole area.

d- Collect all needed reports of Agriculture and Irrigation departments in the area.

e- Collect all crop patterns of the recent years as to generalize the cropping situation



C- Investigation targets;

- Accurate calculations of actual water requirements of the area from agro meteorological data using the moderns equation of Modified Penman – Monteith (1997).
- Accurate calculation of the needed irrigation requirements of the existed crop pattern and soil information.
- Monthly basis of planning for accurate application of calculated irrigation requirements over the year.
- Recommending with needed modifications of the existed irrigation schedules.
- Suggesting some scenarios for controlling the over using of ground water of some well samples, and the efficient use of over flooding of others.
- Future Vision for the situation when applying modern irrigation system.

General recommendations for cultivation with some modern techniques which could participate with enhancing Water Use Efficiency



| 1.47 | ETo mm/day | 6.10 | 4.72 | 4.81 | 5.91 | 7.81 | 7.99 | 9.32 | 10.80 | 9.89 | 9.74 | 9.91 | 8.42 | 7.95 | 1.0. 2.11 |
|--------------------|-----------------|------|-------|-------|-------|-------|-------|--------|---------|-----------------------|---------|---------|---------|--------|--------------------------------|
| Avg. 30 Year | م3 / فدان / يوم | 30 | 14 | 14 | 14 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 26.0 | الإحدياج المائى م3/فدان/ |
| Season | Crop | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | Ma. | Jun. | Jul. | Aug. | Sept. | Oct. | متوسط | موسم |
| | Wheat | 3.40 | 7.29 | 15.62 | 33.63 | 28.99 | 9.88 | | | | | | | 16.47 | 2915.0 |
| | Barley | 3.40 | 7.29 | 15.62 | 33.63 | 26.09 | 9.88 | | | | | | | 15.99 | 2610.5 |
| | Faba Bean | 3.96 | 8.02 | 15.62 | 32.17 | 30.44 | 14.82 | | | | | | | 17.51 | 2972.7 |
| | Alfalfa | 3.40 | 7.29 | 12.50 | 19.74 | 36.23 | 34.09 | 39.76 | 44.07 | 40.37 | 36.14 | 33.09 | 24.99 | 27.64 | 10108.2 |
| | Clover | 4.53 | 10.21 | 23.33 | 23.39 | 30.44 | 24.70 | | | | | | | 19.43 | 3323.8 |
| | Union green | 1.70 | 7.29 | 14.58 | 20.47 | 30.44 | | | | | | | | 14.90 | 1653.9 |
| | " heads | 1.70 | 7.29 | 14.58 | 24.31 | 27.06 | 22.48 | | | | | | | 16.24 | 2922.7 |
| | " store | | 1.31 | 7.44 | 17.91 | 32.13 | 22.48 | | | | | | | 16.25 | 2423.5 |
| | Lettuce | 3.40 | 10.21 | 21.87 | 19.74 | 9.66 | | | | | | | | 12.98 | 1939.0 |
| XX / · | Fasollus B. | 1.70 | 10.21 | 23.95 | 24.86 | 21.74 | 9.88 | | | | | | | 15.39 | 2729.8 |
| Winter | Helba | 4.53 | 10.21 | 23.33 | 23.39 | 30.44 | 24.70 | | | | | | | 19.43 | 2897.7 |
| | Termis | | 2.63 | 10.41 | 26.87 | 23.19 | 12.35 | | | | | | | 15.09 | 1986.6 |
| | Hommus | | 2.63 | 10.41 | 26.87 | 23.19 | 12.35 | | | | | | | 15.09 | 1986.6 |
| | Cesal | 3.40 | 7.29 | 14.58 | 32.17 | 34.79 | 9.88 | | | | | | | 17.02 | 2945.2 |
| | Sugar cane | 4.53 | 7.29 | 14.58 | 26.32 | 43.48 | 54.35 | 63.39 | 73.45 | 67.29 | 60.24 | 55.15 | 41.65 | 42.64 | 15596.7 |
| | " Beet | 4.53 | 8.75 | 16.66 | 32.75 | 30.92 | 19.76 | | | | | | | 18.90 | 3324.2 |
| | Canula | 4.53 | 8.75 | 16.66 | 36.85 | 33.82 | 19.76 | | | | | | | 20.06 | 3331.1 |
| | Ornamentals | 3.40 | 7.29 | 14.58 | 33.63 | 23.19 | 9.88 | | | | | | | 15.33 | 2638.1 |
| | Vegetables | 3.40 | 7.29 | 18.74 | 17.55 | 11.60 | | | | | | | | 11.72 | 1446.8 |
| | Orchards | | | 9.52 | 16.45 | 26.57 | 29.64 | 34.58 | 40.06 | 39.76 | 36.14 | 27.57 | 16.66 | 27.70 | 8020.3 |
| | Rice | | | | | | | 44.3 | 37 53.7 | 75 53.5 | 53 55.4 | 42 61.2 | 28 | 53.6 | <mark>7</mark> 8203.6 |
| | Zea Maize | | | | | | | 6.92 | 2 23.3 | 37 <mark>56.</mark> 2 | 28 36.1 | 14 | | 30.6 | 58 3536.0 |
| Summ | White Maize | | | | | | | 6.92 | 2 23.3 | 37 <mark>49.</mark> 2 | 25 50.6 | 50 36.7 | 7 | 33.3 | <mark>8</mark> 4309.1 |
| -er | Sudan Bean | | | | | | 4.45 | 5 12.9 | 07 25.7 | 71 36.7 | 70 56.9 | 92 52.0 |)9 31.2 | 4 31.4 | <mark>4</mark> 6579.6 |
| 2 | Sunflower | | | | | | | 6.05 | 5 16.6 | 59 <mark>32.</mark> 1 | 2 53.0 |)1 36.7 | 77 | 28.9 | 3 3892.2 |
| | Sesam | | | | | | | 6.05 | 5 25.0 |)4 47.1 | 10 36.1 | 14 | | 28.5 | 8 3452.8 |

Table A : Daily irrigation requirements for the existed crop pattern in the area before modification using surface irrigation system



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

| | Soya Bean | | | | | | | 5.19 | 16.69 | 29.98 | 55.42 | 33.09 | | 28.07 | 3821.4 |
|--------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|
| | Cotton | | | | | 5.07 | 17.29 | 44.37 | 42.73 | 33.03 | 21.08 | | | 27.26 | 4930.0 |
| | Alfalfa | 3.40 | 7.29 | 12.50 | 19.74 | 36.23 | 34.09 | 39.76 | 44.07 | 40.37 | 36.14 | 33.09 | 24.99 | 27.64 | 10108.2 |
| | Amazingseed | | | | | | | 6.05 | 25.04 | 47.10 | 28.91 | 14.71 | | 24.36 | 3536.7 |
| | Fodder Z.M. | | | | | | | 6.92 | 23.37 | 56.28 | 36.14 | | | 30.68 | 3563.7 |
| | " White M. | | | | | | | 6.92 | 23.37 | 49.25 | 50.60 | 36.77 | | 33.38 | 4336.8 |
| | Fod.Lupinus | | | | | | | 5.19 | 16.69 | 29.98 | 55.42 | 36.77 | | 28.81 | 3961.1 |
| | Sorghum | | | | | | | 6.92 | 23.37 | 49.25 | 28.91 | 21.45 | | 25.98 | 3763.9 |
| | " green | | | | | | | 6.92 | 20.03 | 29.98 | 55.42 | 33.09 | 18.22 | 27.28 | 4581.4 |
| | Ornamentals | | | | | | | 5.19 | 16.69 | 29.98 | 48.49 | 34.32 | 21.87 | 26.09 | 4189.5 |
| | Vegetables | | | | | | | 5.19 | 16.69 | 38.54 | 28.91 | 14.71 | 0.00 | 17.34 | 3193.8 |
| | Orchards | | | 9.52 | 16.45 | 26.57 | 29.64 | 34.58 | 40.06 | 39.76 | 36.14 | 27.57 | 16.66 | 27.70 | 8020.3 |
| | Zea Maize | 22.64 | | | | | | | | | 7.23 | 21.45 | 47.90 | 24.80 | 3031.5 |
| | White M. | 31.69 | 17.51 | | | | | | | | 7.23 | 21.45 | 41.91 | 23.96 | 3432.7 |
| Nile | Fodder M. | 31.69 | 17.51 | | | | | | | | 7.23 | 21.45 | 41.91 | 23.96 | 3607.8 |
| Season | Sorghum | 18.11 | 10.21 | | | | | | | | 7.23 | 21.45 | 41.91 | 19.78 | 2893.9 |
| | Sudan Grass | 21.13 | 10.21 | | | | | | | | 5.42 | 21.45 | 36.45 | 18.93 | 2759.0 |
| | Vegetables | 18.11 | 7.00 | | | | | | | | 5.42 | 15.32 | 32.80 | 15.73 | 2201.8 |
| Averag | e | 8.79 | 8.33 | 15.30 | 25.40 | 27.06 | 20.30 | 18.77 | 30.20 | 42.66 | 34.89 | 30.90 | 29.28 | 24.32 | 4174.5 |



| | | الاحتداج |
|--|-------|--------------------|
| Avg. 30 Year م3 / فدان / يوم 14 14 14 30 30 30 30 30 30 30 30 30 30 30 30 30 | 26.0 | المائی م3/فدان/ |
| الموسم Crop Nov. Dec. Jan. Feb. Mar. Apr. Ma. Jun. Jul. Aug. Sept. Oct. | متوسط | موسم |
| Wheat 3.40 7.29 15.62 33.63 28.99 9.88 | 16.47 | 2915.0 |
| Barley 3.40 7.29 15.62 33.63 26.09 9.88 | 15.99 | 2610.5 |
| Faba Bean 3.96 8.02 15.62 32.17 30.44 14.82 | 17.51 | 2972.7 |
| Alfalfa 3.40 7.29 12.50 19.74 36.23 34.09 39.76 44.07 40.37 36.14 33.09 24.99 | 27.64 | 10108.2 |
| Clover 4.53 10.21 23.33 23.39 30.44 24.70 | 19.43 | 3323.8 |
| Union green 1.70 7.29 14.58 20.47 30.44 | 14.90 | 1653.9 |
| " heads 1.70 7.29 14.58 24.31 27.06 22.48 | 16.24 | 2922.7 |
| " store 1.31 7.44 17.91 32.13 22.48 | 16.25 | 2423.5 |
| Lettuce 3.40 10.21 21.87 19.74 9.66 | 12.98 | 1939.0 |
| Winter Fasollus B. 1.70 10.21 23.95 24.86 21.74 9.88 | 15.39 | 2729.8 |
| Helba 4.53 10.21 23.33 23.39 30.44 24.70 | 19.43 | 2897.7 |
| Termis 2.63 10.41 26.87 23.19 12.35 | 15.09 | 1986.6 |
| Hommus 2.63 10.41 26.87 23.19 12.35 | 15.09 | 1986.6 |
| Cesal 3.40 7.29 14.58 32.17 34.79 9.88 | 17.02 | 2945.2 |
| Sugar cane 4.53 7.29 14.58 26.32 43.48 54.35 63.39 73.45 67.29 60.24 55.15 41.65 | 42.64 | 15596.7 |
| " Beet 4.53 8.75 16.66 32.75 30.92 19.76 | 18.90 | 3324.2 |
| Canula 4.53 8.75 16.66 36.85 33.82 19.76 | 20.06 | 3331.1 |
| Ornamentals 3.40 7.29 14.58 33.63 23.19 9.88 | 15.33 | 2638.1 |
| Vegetables 3.40 7.29 18.74 17.55 11.60 | 11.72 | 1446.8 |
| Orchards 9.52 16.45 26.57 29.64 34.58 40.06 39.76 36.14 27.57 16.66 | 27.70 | 8020.3 |
| Rice 44.37 53.75 53.53 55.42 61.28 | 53.67 | 8203.6 |
| Zea Maize 6.92 23.37 56.28 36.14 | 30.68 | 3536.0 |
| White Maize 6.92 23.37 49.25 50.60 36.77 | 33.38 | 4309.1 |
| Sudan Bean 4.45 12.97 25.71 36.70 56.92 52.09 31.24 | 31.44 | 6579.6 |
| Sunflower 6.05 16.69 32.12 53.01 36.77 | 28.93 | 3892.2 |
| Sesam 6.05 25.04 47.10 36.14 | 28.58 | 3452.8 |
| Soya Bean 5.19 16.69 29.98 55.42 33.09 | 28.07 | 3821.4 |
| Cotton 5.07 17.29 44.37 42.73 33.03 21.08 | 27.26 | 4930.0 |
| Summ Alfalfa 3.40 7.29 12.50 19.74 36.23 34.09 39.76 44.07 40.37 36.14 33.09 24.99 | 27.64 | 10108.2 |
| Amazingseed 6.05 25.04 47.10 28.91 14.71 | 24.36 | 3536.7 |
| Fodder Z.M 6.92 23.37 56.28 36.14 | 30.68 | 3563.7 |
| "White M 6.92 23.37 49.25 50.60 36.77 | 33.38 | 4336.8 |
| Fod.Lupinus 5.19 16.69 29.98 55.42 36.77 | 28.81 | 3961.1 |
| Sorghum 6.92 23.37 49.25 28.91 21.45 | 25.98 | 3763.9 |
| " green 6.92 20.03 29.98 55.42 33.09 18.22 | 27.28 | 4581.4 |
| Ornamentals 5.19 16.69 29.98 48.49 34.32 21.87 | 26.09 | 4189.5 |
| Vegetables 5.19 16.69 38.54 28.91 14.71 0.00 | 17.34 | 3193.8 |

Table B : Daily irrigation requirements for the existed crop pattern in the area \underline{after} modification using surface irrigation system.



| | Orchards | | | 9.52 | 16.45 | 26.57 | 29.64 | 34.58 | 40.06 | 39.76 | 36.14 | 27.57 | 16.66 | 27.70 | 8020.3 |
|---------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| | Zea Maize | 22.64 | | | | | | | | | 7.23 | 21.45 | 47.90 | 24.80 | 3031.5 |
| | White Maize | 31.69 | 17.51 | | | | | | | | 7.23 | 21.45 | 41.91 | 23.96 | 3432.7 |
| Nile | Fodder M. | 31.69 | 17.51 | | | | | | | | 7.23 | 21.45 | 41.91 | 23.96 | 3607.8 |
| Season | Sorghum | 18.11 | 10.21 | | | | | | | | 7.23 | 21.45 | 41.91 | 19.78 | 2893.9 |
| | Sudan Grass | 21.13 | 10.21 | | | | | | | | 5.42 | 21.45 | 36.45 | 18.93 | 2759.0 |
| | Vegetables | 18.11 | 7.00 | | | | | | | | 5.42 | 15.32 | 32.80 | 15.73 | 2201.8 |
| Average | • | 8.79 | 8.33 | 15.30 | 25.40 | 27.06 | 20.30 | 18.77 | 30.20 | 42.66 | 34.89 | 30.90 | 29.28 | 24.32 | 4174.5 |
| | | | | | | | | | | | | | | | |

Notes on Tables A & B (Water requirements of the crop pattern of New Valley)

1-Disappearance of water shortage in February.

2-Saving irrigation water in **November** for almost main crops.

3-Critical case for Rice, Sugar cane And Alfalfa crops especially in summer months which need excess irrigation water than the actually get (from June to September).4-It is needed to be flexible in application of irrigation water in each month up to the cultivated crop as they differentiated greatly.

| Table | С | : | Daily | irrigatio | on 1 | requireme | ents | for | the | existed | crop | pattern | in | the | area | <u>after</u> |
|-------|-------|----|---------|------------------|------|------------------|------|-------------|-----|---------|------|---------|----|-----|------|--------------|
| modif | icati | or | n using | g with <u>dr</u> | ip i | <i>rrigation</i> | syst | <u>em .</u> | | | | | | | | |
| | | | | | | | | | | | | | | | | |

| 1.20 | ETo mm/day | 6.10 | 4.72 | 4.81 | 5.91 | 7.81 | 7.99 | 9.32 | 10.80 | 9.89 | 9.74 | 9.91 | 8.42 | 7.95 | |
|-----------------|-------------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------------------------|
| Avg. 30 Year | M3/Fed/Day | 30 | 14 | 14 | 14 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 26.0 | Daily W.Req. m3/Fedم3/فدان |
| Season | Crop | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | Ma. | Jun. | Jul. | Aug. | Sept. | Oct. | متوسط | |
| | Wheat | 1.80 | 3.87 | 8.29 | 17.85 | 15.39 | 5.25 | | | | | | | 8.74 | 1547.67 |
| | Barley | 1.80 | 3.87 | 8.29 | 17.85 | 13.85 | 5.25 | | | | | | | 8.49 | 1386.02 |
| | Faba Bean | 2.10 | 4.26 | 8.29 | 17.08 | 16.16 | 7.87 | | | | | | | 9.29 | 1578.33 |
| | Alfalfa | 1.80 | 3.87 | 6.63 | 10.48 | 19.24 | 18.10 | 21.11 | 23.40 | 21.44 | 19.19 | 17.57 | 13.27 | 14.68 | 5366.85 |
| | Clover | 2.40 | 5.42 | 12.39 | 12.42 | 16.16 | 13.12 | | | | | | | 10.32 | 1764.74 |
| | Union green | 0.90 | 3.87 | 7.74 | 10.87 | 16.16 | | | | | | | | 7.91 | 878.10 |
| | " heads | 0.90 | 3.87 | 7.74 | 12.91 | 14.36 | 11.94 | | | | | | | 8.62 | 1551.81 |
| | " store | | 0.70 | 3.95 | 9.51 | 17.06 | 11.94 | | | | | | | 8.63 | 1286.72 |
| | Lettuce | 1.80 | 5.42 | 11.61 | 10.48 | 5.13 | | | | | | | | 6.89 | 1029.48 |
| Winter | Fasollus B. | 0.90 | 5.42 | 12.72 | 13.20 | 11.54 | 5.25 | | | | | | | 8.17 | 1449.36 |
| winter | Helba | 2.40 | 5.42 | 12.39 | 12.42 | 16.16 | 13.12 | | | | | | | 10.32 | 1538.49 |
| | Termis | | 1.39 | 5.53 | 14.26 | 12.31 | 6.56 | | | | | | | 8.01 | 1054.75 |
| | Hommus | | 1.39 | 5.53 | 14.26 | 12.31 | 6.56 | | | | | | | 8.01 | 1054.75 |
| | Cesal | 1.80 | 3.87 | 7.74 | 17.08 | 18.47 | 5.25 | | | | | | | 9.04 | 1563.73 |
| | Sugar cane | 2.40 | 3.87 | 7.74 | 13.97 | 23.09 | 28.85 | 33.66 | 39.00 | 35.73 | 31.98 | 29.28 | 22.12 | 22.64 | 8280.93 |
| | " Beet | 2.40 | 4.65 | 8.85 | 17.39 | 16.42 | 10.49 | | | | | | | 10.03 | 1764.98 |
| | Canula | 2.40 | 4.65 | 8.85 | 19.56 | 17.96 | 10.49 | | | | | | | 10.65 | 1768.63 |
| | Ornamentals | 1.80 | 3.87 | 7.74 | 17.85 | 12.31 | 5.25 | | | | | | | 8.14 | 1400.68 |
| V | Vegetables | 1.80 | 3.87 | 9.95 | 9.32 | 6.16 | | | | | | | | 6.22 | 768.14 |
| | Orchards | | | 5.06 | 8.73 | 14.11 | 15.74 | 18.36 | 21.27 | 21.11 | 19.19 | 14.64 | 8.85 | 14.71 | 4258.33 |



| | Disa | | | | | | | 22 50 | 20 51 | 20 42 | 20.42 | 22 52 | | 29.40 | 1255 (5 |
|---------|-------------|---------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|
| | Rice | | | | | | | 23.30 | 28.54 | 28.42 | 29.42 | 32.33 | | 28.49 | 4355.05 |
| | Zea Maize | | | | | | | 3.67 | 12.41 | 29.88 | 19.19 | | | 16.29 | 1877.42 |
| | White Maize | | | | | | | 3.67 | 12.41 | 26.15 | 26.87 | 19.52 | | 17.72 | 2287.89 |
| | Sudan Bean | | | | | | 2.36 | 6.88 | 13.65 | 19.49 | 30.22 | 27.65 | 16.59 | 16.69 | 3493.37 |
| | Sunflower | | | | | | | 3.21 | 8.86 | 17.05 | 28.14 | 19.52 | | 15.36 | 2066.53 |
| | Sesam | | | | | | | 3.21 | 13.29 | 25.01 | 19.19 | | | 15.18 | 1833.23 |
| | Soya Bean | | | | | | | 2.75 | 8.86 | 15.92 | 29.42 | 17.57 | | 14.90 | 2028.92 |
| | Cotton | | | | | 2.69 | 9.18 | 23.56 | 22.69 | 17.54 | 11.19 | | | 14.48 | 2617.54 |
| Summ | Alfalfa | 1.80 | 3.87 | 6.63 | 10.48 | 19.24 | 18.10 | 21.11 | 23.40 | 21.44 | 19.19 | 17.57 | 13.27 | 14.68 | 5366.85 |
| -er | Amazingseed | | | | | | | 3.21 | 13.29 | 25.01 | 15.35 | 7.81 | | 12.94 | 1877.79 |
| | Fodder Z.M. | | | | | | | 3.67 | 12.41 | 29.88 | 19.19 | 0.00 | | 13.03 | 1892.11 |
| | " White M. | | | | | | | 3.67 | 12.41 | 26.15 | 26.87 | 19.52 | | 17.72 | 2302.58 |
| | Fod.Lupinus | | | | | | | 2.75 | 8.86 | 15.92 | 29.42 | 19.52 | | 15.30 | 2103.10 |
| | Sorghum | | | | | | | 3.67 | 12.41 | 26.15 | 15.35 | 11.39 | | 13.79 | 1998.41 |
| | " green | | | | | | | 3.67 | 10.64 | 15.92 | 29.42 | 17.57 | 9.68 | 14.48 | 2432.47 |
| | Ornamentals | | | | | | | 2.75 | 8.86 | 15.92 | 25.75 | 18.22 | 11.61 | 13.85 | 2224.36 |
| | Vegetables | | | | | | | 2.75 | 8.86 | 20.46 | 15.35 | 7.81 | | 11.05 | 1695.72 |
| | Orchards | | | 5.06 | 8.73 | 14.11 | 15.74 | 18.36 | 21.27 | 21.11 | 19.19 | 14.64 | 8.85 | 14.71 | 4258.33 |
| | Zea Maize | 12.02 | | | | | | | | | 3.84 | 11.39 | 25.43 | 13.17 | 1609.57 |
| | White M. | 16.83 | 9.30 | | | | | | | | 3.84 | 11.39 | 22.25 | 12.72 | 1822.57 |
| Nile | Fodder M. | 16.83 | 9.30 | | | | | | | | 3.84 | 11.39 | 22.25 | 12.72 | 1915.53 |
| Season | Sorghum | 9.62 | 5.42 | | | | | | | | 3.84 | 11.39 | 22.25 | 10.50 | 1536.51 |
| | Sudan Grass | 11.22 | 5.42 | | | | | | | | 2.88 | 11.39 | 19.35 | 10.05 | 1464.86 |
| | Vegetables | 9.62 | 3.72 | | | | | | | | 2.88 | 8.13 | 17.42 | 8.35 | 1169.03 |
| Average | 2 | Average | 4.42 | 8.12 | 13.49 | 14.36 | 10.78 | 9.97 | 16.04 | 22.65 | 18.53 | 15.72 | 16.66 | 12.45 | 2216.43 |

Notes on tables B & C (comparing surface and drip irrigation systems)

1-Disappearance of most irrigation deficiency marks for almost all crops in all months.2-Saving about 47 % of irrigation water as a whole, by means of the ability to cultivate double the already cultivated area.

General recommendations

1-Deviating the months of **minimum** irrigation requirements to be through **November** to January.

2-The urgent need to a **flexible system** for irrigation application to face the months of **maximum** needs in summer depending on saving water from winter low requirements.3-Recommended with **gradual change** of surface to modern drip irrigation system.

Notes:

1-"About **33 from 54** wells are depended on pumping as they haven't sufficient inner pressure , while the rest are "**naturally flooded**".

2-The cultivated areas **outside** the contributed ones for the wells ranged from 2 - 30 % in "Elkharga Oasis only, which consume ~ One Million m3 / y.



3-The case is critical in this location as almost all wells depend on pumping, so it is expected to fall down the underground water levels.

So, the expected question is , what we can do?

Answers:

The answers for this critical question are as following

A-Scenarios of modifying the crop pattern ;

1-By converting 1/2 the area of Alfalfa crop, which has the highest water requirements among all crops, by summer and winter fodder crops. This scenario compensates ~ 27 % of the water shortage.

2-By converting **all** Alfalfa area to other winter & summer fodder crops which have lower water requirements like sorghum, lupines, Sudan grass, Egyptian clover, Canola, etc.

However, this scenario compensate the water shortage by ~ 45 %.

3-By converting **all** alfalfa area to winter fodder crop like Egyp. Clover, which has low water requirements .

However, this scenario give the result as the previous one .

So, it seems that the solution "2" is the best one as it provide fodders allover the year .

B-Scenarios for upraising Water Use Efficiency WUE

1-By connecting **the naturally over flooded** wells with the adjacent **ones which suffer from severe pumping**. Actually, there were many recorded cases for this configuration, which may need to some simplified feasibility studies on the mechanism of connection.

2-For **the naturally over flooded wells** than the needed amounts , the excess water could be directed to ;

a-Either **cultivating highly water consuming crops** (likeAlfalfa, Rice) **ONLY** in these locations.

b-Reclaiming other new lands.

3-For the **wells depending on pumping** it is urgent **to control** their flood through solid system of pumping adjusted for the needed amounts of irrigation requirements **monthly or even daily**.

C-Scenario of reusing of drainage water

This scenario can be adopted with these wells those **severely suffered from water shortage** than demands and their locations don't permit to adopt other scenarios (like 1 in B). However, in all cases the kind of irrigation water and irrigated lands must be considered under these conditions.

D-General scenario of transforming irrigation system from surface to modern drip irrigation one



However, the general calculations for the existed crop pattern in the area when adopting this system give ~ 47 % water saving for the totally consumed amount of water. Simply, in other words, we can cultivate double the already cultivated area. Tackled Items of ESI 2005 by Adopted Packages

ESI (2005) Bio-org. WUE improve. Crop Pattern Wind&Water Parameters Tech.I II adjust. III control IV

A-SYSTEMS

- 1-Cultivated Systems
- 2- Managed Forests
- 3- Fisheries
- 4- Water quant.
- 5-Qual.
- 6-Air quality
- 7- Landscape
- 8- Biodiversity
- 9- Sensitive eco-System

B- STRESSES

- 1-Air pollution.
- 2-Water
- 3-Water consum.
- 4-Stresses on eco-System func.
- .. 5-Waste&consum.
 - 6-Releases of tox. 7-Soil degrade.

C- HUMAN VULNERABILITY

- 1-Food security
- 2-Environ. health
- 3-Susceptibly to Env. Disasters
- 4-Economic secure.

D- SOCIAL & INSTITUTIONAL CAPACIT

1-Environ. Govern.
 2-Science& Tech.
 3-Private sector Responsiveness
 4-Eco-efficiency



E- GLOBAL STEWARDSHIP

1-Greenhouse gas Emissions2-Participation in Inter.Collab.3-Transboundary Env.pressures

4-Envir.Impacts On trade

Notes: I are Modern Bio-Organic Techniques affected 26 items II are Water Use Efficiency Techniques 23 III are Crop pattern adjustment Techniques 23 IV are Wind & Water control Techniques 20





ENDANGERED NATIONAL PARK: MUNZUR – TURKEY

1Ozgur YILMAZER; 1Ozlem YILMAZER; 1Servet ARMAC; 2Ilyas YILMAZER; 1Yasemin LEVENTELI

1 YILMAZER Education, Ankara-TURKEY 2 YY University, Van – TURKEY; ilyas_yilmazer@yahoo.com

The Munzur River and its catchment area gained a national park status in 1971to be protected nationally and internationally. It takes place at the eastern part of the Anatolia. The region has 227 endemic floras over 1500 species. Munzur springs with a total discharge rate of over 40 m3/s seeps out through crystalline limestone. The catchment area is a virgin land which does not have any pollution source in the region. The Munzur springs can supply clean drinkable water for over 600 million persons. In another saying this source is sufficient for the Arabian and North African countries via a pipe lined with boron glass. In spite of those some international companies want to construct 8 dams to provide 1% of the country's electricity for at most 40 years. By the way the springs will be killed forever. Engineering economy is the first criterion that has to be taken into account in engineering projects. The principles of the engineering economy showed that the outcome of the project is 5 times greater than income. The income and outcome of a dam project with an economic life of 40 years, is compared according to the values gained till the end of the period of 40 years. In this evaluation the base criteria will be the same. Hence, the result does not change considerably. To reach a sound and reliable comparison, it is recommended to assess the project in terms of timing, environment, safety, and cost (**TESC**) and express the results in numbers. These values will be changed with respect to the end of the economic life of the project. The cheapest and the most downstream dam is Uzunçayır dam. It is still under construction since 1994. Its expected income is than one fourth of the outcome. Hence, one can easily reach a conclusion that such works can not be an engineering project. Public cannot act as stakeholder since the 1972 martial law.

Keywords: Munzur; Springs; Pipeline; Environment; Dam; Catastrophe.

1. INTRODUCTION

Munzur is the uppermost hook of the civilization Mesopotamia Munzur Mountain range and the river Munzur with a mean annual discharge rate 86.7 m3/s formed an essential base for the old civilizations in this region.

Recently the region of Tunceli is under attack by unknown (?) forces. The attack is in three modes namely-

(1) To move the old city Tunceli into a fertile alluvial plain which will be invaded Uzuncayir dam reservoir. The dam is about to be completed.

(2) To operate cupper and gold mines via galleries and underground excavations in the catchment area of Munzur river.



(3) Last but not least, 8 dams will be constructed on the river Munzur which is backbone of the endemic flora and fauna besides the indigenous people. All of the dams are for energy production.

2. RELOCATION OF THE CITY CENTRE

In October of 2000 the responsible directorate decided to move Tunceli into the fertile alluvial plain of the river Munzur. The new settlement area is open and subject to first degree earthquake whereas the present location is not.

The Kocaeli earthquake which hit in 1999 proved once again that earthquakes do not destroy buildings if they are founded in/on rocky ground. A thick soil ground is vitally important for farming. The Constitutional Laws (Articles 43-46, & 168) and the other law accepted on 25.03.2005 protect and preserve the soil grounds for farming. The 1999 Kocaeli Earthquake did not create even a single crack on buildings founded on Kocaeli rocks even they are adjacent to the epicenter. However, the buildings in farm lands were destroyed even they are very far from the epicenter. In spite of this reality, decision makers decided to relocate Tunceli from rocky grounds) to fertile Munzur plain in 2000. Majority of this plain will be buried by the Uzuncayir dam which is under construction since 1994. *This might be a way to keep people away from motherland and fatherland..!* This assault was stopped by a continuous scientific work.

However, most of the official buildings including the governor house were shifted to the Munzur farm land. This is a note which will have great value when the first earthquake hit this region within the coming 20 years. No doubt that all the buildings will be adversely affected from any earthquake with a magnitude greater than 6.5 in the delineated area. A similar note in 1992 against the factory Ford in the heart of the Gölcük (Kocaeli) turned into reality. At the end of the 7 years struggling they completed design and construction by 1999. The Kocaeli earthquake ruined the factory and one-flat factory with piles, totally 15,000.00 m and each 40 m in depth sunk down about 2.6 meters. Because, liquefaction can only occur in soil grounds not in rocky grounds. General view of Tunceli founded on rocky ground looking at eastwards.

3. MINING ACTIVITIES

Three years of struggling against the relocation of Tunceli city centre, the authors and their team succeeded to settle over the rocky grounds as well. Meanwhile some part of the city and particularly the government buildings were erected in the plain soil ground. Then a new story was commenced. It is to operate the metallic mines especially gold and copper. Someone may state that an unknown force wants to destroy the natural equilibrium of the Munzur springs forever by mining activities. The profit, for at most ten years of exploitation, is less than 1 billion dollars. However, the annual income of the springs, upon using half of the discharge (43 m3/s), starts by 30 billion dollars and will go beyond 150 billion dollars with time.



Useful life of the proposed project is infinite. The outer skin of an apple with a thickness of about 0.01 protects the fruit. If this thin film is peeled, irreversible oxidization and decay starts immediately. The mining activities will kill the invaluable nature of the Munzur springs Views from the natural and perennial springs of Munzur.

An engineer project can not be accepted without being assessed in terms of timing, environment, safety, and cost (**TESC**). International definition says that an engineer is a person who can do for one dollar what any fool can do for two dollars (Christopher, 1982). The mining project, in terms of TESC is unfeasible. However, the exploration drillings have already been commenced.

4. DAM PROJECTS

Besides the indigenous people, all engineers and environmentalists are trying to communicate with decision makers and to tell the metallic mine exploitations will destroy the nature of the Munzur basin. The third mode of assaulting is the dam project. Dams never be a solution to energy shortage, they kill the environment of inhabitants, and their useful life is limited (Yilmazer, 1994; Postgate, 1992; Sinclair, 1989; Ronayne, 2005; Raddum et al., 1994; Eberlin, 2005).

The Munzur spring resources will be lost forever under the dam system consisting of 8 dams on the Munzur river (Dixon et al., 1990; Allan, 2000). As aforesaid, the annual income of the springs, upon using half of them (43 m3/s), starts by 30 billion dollars and will exceed 150 billion dollars with time. Total income from dams is very much less than that of the proposed environment friendly project. Furthermore, the amount of investment for dams is at least 5 times greater than the profit as the case evident for Uzunçayır dam which is under construction since 1994. Dam projects, in general are disaster to the environment (Yilmazer et al., 2001; 2002)

The calculation is based upon the figures from Directorates of State Water Works and Highway. There can not be such an unfeasible engineering project in the world. If there is, there might be corruption and/or non-ethics. Some of the decision makers, who have problems to perceive, opposed our proposal by putting the security issue forward (Armaç, 2005). If the goal is to keep people away from the fatherland and motherland, this will create anarchy and unbearable worries. In the sense of the proverb stating that "a nightingale in a golden lattice moans and cries for a dry bush, homeland of it". One may ask that the natives of Munzur are less respectable than a nightingale...! Income of Uzuncayir dam on the Munzur river and the investment.

n=40 y i= 10% Maintenance cost= 100 000 \$/y 0,035 \$/kWh Income= 11 095 000 \$/y Period (n), y Decrease in income, \$/y Present value (P), \$ 12



14 15 1 0 10.995.000 448.172.354 2 277.375 10.717.625 397.045.292 39 277.375 454.750 390.225 40 277.375 177.375 77.375 3,7 Total income of Uzuncayir dam after 40 years (useful life), \$ 317 GWh/y Future value (F), \$; FV(i;n;P)Investigation - design - construction phase TOTAL, Billion dollars Outcome = 0.0 /y n=55 y i= 10% 2,E+09 Period (n), У Increase in income Present value (P), \$ 1 21.041.207 3.616.393.252 2 21.041.207 3.287.630.229 14 21.041.207 1.047.540.308 15 21.041.207 952.309.371 30.3 Total income of the investmet after 44 years, \$ Increase in lost of the farm lands etc.= 1% \$/y Future value (F), \$; FV(i;n;;P)Investigation design construction phase

TOTAL, Billion dollars Munzur basin is the last place to be ruled by the extraordinary Martial Law of 1980. In the period of 1980-1989, Munzur was like Sinop which is my hometown in regards with anarchy. It was quite and peaceful. Moreover, the Munzur is the last place escaped from the extraordinary ruling system. The ultimate aim of the unknown (?) force and its local servants and collaborators is to kill the invaluable Munzur via mining activities and/or dam projects (Dolatyar et al., 2000). We believe that the repulsing this assault is a must for the humankind.



5. CONCLUSIONS AND RECOMMENDATIONS

The Munzur resources will serve forever our nation which succeeded an independence war and became a model for the other nations colonized by imperialists. It is strongly recommended to keep in mind that the worth of the Munzur spring resources is thousand times greater than that of Boron that is another important resource, because of the inexhaustible character of Munzur springs in the natural hydrological cycle. The Munzur Springs are so clean and fresh to be utilized as domestic water supply without treatment. It is already been exploited and bottled. It is abut one millionth of the discharge rate. Hence, it is strictly recommended to convey Munzur spring water to North African countries through Arabian Plate countries for drinking purpose via a pipeline system.

REFERENCES

Allan, J.A., 2000. The Middle East Water Question: Hydropolitics and The Global Economy. London:I.B. Taurus, p.73.

Armaç, S., 2005. The last loop of the Upper Mesopotamia: Munzur (MSc. Thesis, abstracted in English). YYÜ, 101 p., Van/Turkey.

Christopher, C. M., 1981. Engineering geology. Bell & Howell Company, 450 p.

Dixon, J. A., Talbot, L. M., And Le Moigne, G. J. M., 1990. Dams and the Environment,

Considerations in World Bank Projects. World Bank Technical Paper Number 110.

Dolatyar, M. and Gray, T.S., 2000. Water politics in the Middle East: A context for Conflict or Cooperation? London: Macmillan Press. 145.

Raddum, G. G., Fjelheim, A., 1994. Impact of hydropower development on aquatic invertebrates.

Norwegian Journal of Geography, vol. (48): 39-44.

Ronayne, M., 2005. The Cultural and Environmental Impact on Large Dams in Southeast Turkey.

Fact-finding Mission Report, National University of Ireland, Galway. 162.

Postgate, J.N., 1992. Early Mesopotamia. London: Rutledge. 11.

Sinclair, T.A., 1989. Eastern Turkey: An architectural and Archeological Survey, Pindar Press. Vol: 3,

London. 85.

Yilmazer, İ., 1994. About the relationships between hydropower and the environment (abstracted in

English). The 6th energy congress of Turkey, vol. 2, pp 413-420, İzmir/Turkey.

Yilmazer, İ., Çan, T., and Yilmazer, Ö., and Duman T., 2002. How to produce more energy through

pipeline system. International Environmental Conference on Environmental Problems of the Mediterranean Region, 12 - 15 April, Near East University, Nicosia, North Cyprus.

Yilmazer, I., & Yilmazer, Ö., 2001a. How to save the international heritage Hasankeyf and produce

more energy Tigris basin. The 4th International Symposium on Eastern Mediterranean Region Geology, May 21–25 '01, Isparta – TURKEY. p. 163.





URBAN AGRICULTURE: AN INSTRUMENT FOR SUSTAINABLE URBAN DEVELOPMENT IN THE METROPOLITAN CITY OF ISTANBUL

Ulas AKIN*

Istanbul Technical University, Urban & Regional Planning Program ulasakin2003@yahoo.com

Urban agriculture (UA) as a tool for sustainable development in cities and urban regions has been significantly important since the last decade for either developed (Bills, 1991; Patel, 1996; Kaufman, 1999) or developing countries. Global institutions such as Food and Agriculture Organization (FAO), and United Nations Development Program (UNDP) have been supporting these activities, as a result of its diverse positive impacts on economic, social and environmental means.

Although, agriculture itself is controversial with the concept of 'urban' where the accumulation of non-agricultural facilities take place, UA contributes to improve the capacity of economic growth for certain groups such as urban poor, women, migrants, and other disadvantaged groups in communities which are considerably important to achieve social sustainability in urban areas as well as environmental sustainability. Beside, UA functions as a catalyst to create sense of community or supporting community by providing collaborative working environment, add to this, it is also an important environmental education tool of both youngsters and elderly. Another dimensions of its impacts are increasing urban landscape quality by being an urban design element (Viljoen, Bohn, Howe, 2005), improving food quality (Brown and Carter, 2003; Hubbard and Onumahi, 2001) and significant contribution on environmental quality (Belevi and Baumgartner, 2003) and urban sustainability at local and global levels by reducing urban ecological footprint at physical, social and economical dimensions. This paper aims to examine the potential impacts of UA as a tool for sustainable urban development in the City of Istanbul by discussing the following issues and raised questions. What has been done in terms of UA in the metropolitan city of Istanbul up-to-day? What are the characteristics of project cases? What have been roles of local governments and do they have policies, programs? What capacity areas should be addressed in order to integrate UA as a sustainable urban development strategy for the city of Istanbul?

Literature review for the paper has been conducted mainly from secondary data sources on the basis of interaction between sustainable urban development and UA activities. For the case of Istanbul, historical background and relevance, current agricultural land use and capacity, and selected UA projects described in the light of local urban development and planning strategy, and governance patterns.

Keywords: Sustainable urban development, urban agriculture (UA), Istanbul.

^{*} Urban and Regional Planner, MSc in Regional Planning

IMP (Istanbul Metropolitan Planning & Urban Design Centre), National-Regional Planning/Co-ordination- Strategy Group PhD candidate at Istanbul Technical University, Urban & Regional Planning Program

MA candidate at I H S Erasmus University Rotterdam, Urban Management & Development Program



1. Introduction

In recent years, development studies have paid attention to agricultural activities in and around urban areas (World Bank, 1984; UNDP, 1996). This attention has increased during time with project development, benchmarking, and policy co-ordination dimensions at both local and global levels, and also for both developing and developed countries. For instance, as a current momentum, UA took place in the agenda of World Urban Forum III organized in Vancouver, 2006. Meeting of two controversial concept, "urban" and "agriculture" where it is defined the city -urban settlements- as the concentration of non-agricultural activities, let the communities all around the world more nature friendly, more healthy, more sustainable whereas the cities in to more green, inclusive, socially integrated way (Platt, 2003, 2006; The Humane Metropolis, 2006). Like many conceptualization, there is not yet a universally agreed-upon definition for UA, on the other hand it would be appropriate to overview some of them. For instance, Nugent (1997) defines UA as an activity using house wastes, therefore providing more fresh and inexpensive food, but more it means green space. According to RUAF (Research Centers for Urban Agriculture & Food Security) an important international NGO in this field, urban agriculture can be defined shortly as the growing of plants and the raising of animals within and around cities. So what differs from rural and urban feature of agriculture? According to RUAF, again, that it is integrated into the urban economic and ecological system; urban agriculture is embedded in -and interacting with- the urban ecosystem. This includes urban dwellers as labor force and consumers, use of organic waste and wastewater, positive and negative impacts on urban ecology, being influenced by urban policies and planning, presuure of real estate devlopment on urban land, etc.

| Criteria | Attribute | | | | | | | | | |
|------------|---------------------------|--|--|--|--|--|--|--|--|--|
| | Urban poor | | | | | | | | | |
| Torget | Women | | | | | | | | | |
| roung | Migrants | | | | | | | | | |
| groups | other disadvantaged | | | | | | | | | |
| | groups | | | | | | | | | |
| Location | Urban | | | | | | | | | |
| Location | peri-urban | | | | | | | | | |
| | agricultural production | | | | | | | | | |
| | Processing and | | | | | | | | | |
| Faanamia | marketing | | | | | | | | | |
| Economic | services delivery | | | | | | | | | |
| activities | research and | | | | | | | | | |
| | development | | | | | | | | | |
| | international co-opration | | | | | | | | | |
| Time | permanant use | | | | | | | | | |
| Doriod | long-term | | | | | | | | | |
| renod | short-term | | | | | | | | | |

Table 1. Some attributes of UA

Source: Classified through combining FAO and UNDP definitions.



Major target groups are urban poor, women and migrants within the development contextualization, whereas in developed countries community members and neighborhood dwellers, students and elderly people, urban professionals and people who is in favor of sustainable life interested in or engaged with UA. Peri-urban areas are also captured within the UA locations with urban attribute. UA activities are classified in to three modes of time scale, those are; permanent, long-term and short-term use. Economic activities associated with UA are not only production, or activities related to production such as processing, marketing, service delivery, but also research and development, international co-operation dimensions. This paper is standing at research and development side in peri-urban attribute of UA in case of Istanbul. After given brief background information on UA concept within global policies, examples and their general characteristics are represented. Istanbul case is examined in three aspects; first within historical, background, second within metropolitan scale big picture and third at project level cases.

2. Background of UA Concept within Global Policies

UA is a tool for achieving the sustainable development goals in urban areas by economic, social and environmental dimensions. To what extend can it be? UA contributes the food supply from the nearest place to a city; within or around. Up to the location and size of the UA activity, the role of UA in economic development in a sustainable way differs. While UA contributes to improve the capacity of economic growth for certain groups such as urban poor, women, migrants and other disadvantaged ones, it is considerably important to achieve social sustainability in urban areas. Moreover UA activities function as a tool also for environmental education of school children (School Farms Network, 2006). The linkage between economic and social dimensions of sustainable development carries on with environmental one, where, by definition UA activities are supporting the environmental quality (Belevi and Baumgartner, 2003), green space and recreation areas for cities, as well as functioning as a protecting land use for water basins, wetlands, and other areas under the pressure of uncontrolled development and urban sprawl.



Figure 1. Urban agriculture and related notions.

Source: Modified¹ from Mougeot, 2006.

¹ Modified by adding 'urban planning' to 'land management' set, combining 'urban food supply' and 'urban food security' within single set, and drawing linkages for 'sutainable urban development'.



Figure 1 illustrates the notions related to UA. Although interaction between UA and sustainable urban development is relevant, environmental sustainability, urban survival strategies as a component of social development, urban planning and land management are components to achieve sustainability in urban areas. For that reason this interaction is significantly important and comprehensive as a frame.

In World Urban Forum III 2006, role of UA in the Millennium Development Goals represented in networking event called 'Cultivating Inclusive Cities: Multi-stakeholder Policy Making and Action Planning for Urban Agriculture and Food Security'. Panel is primarily addressed the issue of poverty alleviation and social inclusion as well as how urban agriculture is a land and environmental management strategy (Session Report WUF III, 2006).



Figure 2. Sustainability and Policy Dimensions of UA.

Source: Session Report WUF III, 2006; adapted from Cabannes and Dubbeling (2005) and Mougeot, Luc (2005). Agropolis. IDRC: Ottawa, Canada.



Triangular sustainability framework adapted to UA and embedded within the MDG is a great example of policy co-ordination at global level. The simultaneous achievements are addressed by the orientation of UA activities that two of MDG and five targets can be potentially handled. What it could be taken from this overlapped framework for the case of Istanbul might be the ecological dimension prior to the economic and social ones. Because the major issues on ecological aspects such as ecological agriculture and especially agro-forestry in the periphery, urban greening within urbanized parts; buffer zone and biodiversity management at water basins under development threat are emerging ones in Istanbul.

We are not going to go through the examples from world to proof the relevance of UA in the development agenda.

3. Urban Agriculture in Istanbul: Background for Istanbul Case

The city of Istanbul and its metropolitan area has been challanging major problems like other metropolises in the world. Main issues as outcomes of metropolitan growth have considered by scholars, central and local government authorities focused are quality of life, transportation problems, water and waste management and social cohesion. While challenges in legal and institutional framework for better urban management and governance interelates with global competitive city and European Union participation vision, sustainable urban development is a key notion to capture all issues wheres, hypothetically we address the potential role of UA to achieve this sustainability.

Particularly, in this paper peri-UA is captured within UA conceptualization although it has to be used *metropolitan* attribute while analyzing the City of Istanbul. In spite of that, locationally speaking within the case of Istanbul, *peri-urban* attribute more refers to the rural parts of the province that have just being planned under metropolitan planning approach, where as *urban* attribute refers to the historical settlements and urbanized areas in the last five decades. So we do propose the concept of *metropolitan agriculture* where we have difficult to urban in the context of metropolis.

Answers of questions raised are identified at three dimensions; historical background, metropolitan scale and project level analysis. Historical background of UA in Istanbul characterized with a unique term called *bostan* in Turkish. Bostan is a unit of networked market gardens, usually cultivated vegetables within and around the Old City Walls, as well as in other parts of the City. Their function have not only been providing fresh and delicious organic food, therefore they have served as green area, urban aesthetics element and successor of a tradition since long time. Kaldjian (2004; 2005) pointed out their importance and historical relevance for Istanbul by linking and replacing in to the UA literature, in terms of sustainability that have been existed for more than a millennium. He stressed the existence of *bostans* are one of the strongest argumentation of why this productive activity should be captured by urban life, and stated that most of the professions are interrelated with the past, however *bostans* have some serious meaningful potential to contribute Istanbul's future, that has proven sustainability in urban areas.



Bostans have developed parallel with the city's development, first within and around of Historical Peninsula and than other parts of the city. Kaldijan (2005) investigated that, up to recent years (1998-2005) some of them are still exist, which others are transformed their function to car parking, and housing as a result of urban development. Bostans within the Old City Walls settled almost 20 % of the Historical Peninsula. Obviosly those gardens had fed the city. There are still some bostans concentrated near the city walls, along the Bosphorus settlements, and other parts of Istanbul. We can guess the names of some districts, such as Caddebostan, Bostanci, etc. that in the old times those urban agriculture zones were there. More precise survey may be realised on the basis of historical maps and interviewes to clearly undertstand the historical development for future research.

If we look at the issue towards metropolitan perspective we should mention the agricultural activities in general. Acording to metropolitan planning authoritiy's survey in 2005, total agricultural activities in both European and Asian parts of Istanbul Province took place in 146.574 hectares (362.192,24 acres). This is 27,6 % of whole provincial land, and if we compare with settlement areas that is 21,5 %, agricultural areas are few more than urbanized areas for Istanbul. Majority of type is dry agriculture, comparing with irrigated one and gardening (Table 2).

| Land Use | European Part | Asian Part | Istanbul Total | | | | | | | |
|----------------|-----------------|-----------------|----------------|--|--|--|--|--|--|--|
| | Area (hectares) | Area (hectares) | | | | | | | | |
| Dry Agr. | 112341 | 28242 | 140583 | | | | | | | |
| Irrigated Agr. | 2040 | 1009 | 3049 | | | | | | | |
| Public Water | 1668 | 758 | 2426 | | | | | | | |
| Garden | 294 | 222 | 516 | | | | | | | |
| Grassland | 2436 | 1597 | 4033 | | | | | | | |
| Meadow | 348 | - | 348 | | | | | | | |
| Settlement | 70219 | 44168 | 114387 | | | | | | | |

Table 2. Agricultural Land Use of the Istanbul Province.

Source: 1/100 000 scaled Istanbul Environmental Master Plan Report, 2006.

From continental distribution point, agricultural activities in European side are more than Asian side. Experts explain it with the reasons related to productivity of soil, natural and geological formations. Figure 3 illustrates the spatial distribution of agricultural activities in 2005 according to the surveys.




Source: 1/100 000 scaled Istanbul Environmental Master Plan Report, 2006. **Figure 3.** Agricultural Land Use in Istanbul Metropolitan Area (Provincial Borders)

If we would like to shift from macro picture to micro one, beside the traditional sustainable way of planting within and around the city, there are also some UA projects in Istanbul, in which this paper has interested in. There have been particularly two projects in the European side of the metropolis. The project elaborated here has been initiated by civic society organizations; furthermore we gathered data from them. Initiator NGOs first aimed to develop UA projects in water basins of the city nevertheless communication channels with responsible water board could not established well, so they shift to another strategy that is kicking off by collaboration with district and first level municipalities.

Our example is the project supported by the EU, and it has carried out with local NGO called 'Accessible Life Association'. In the year 2006 the team involved in the project, set up a new NGO specialized in the field of environmental protection and UA called 'Volunteers for Social Development Association' (Toplumsal Kalkinma Gonulluleri Dayanisma ve Yardimlaşma Dernegi²). The project is being carried out by this NGO from now on, as well as new project proposals are in their agenda for new settlements. According to the late 2006 situation (Korkmaz, 2006) four more settlements are targets of the UA actions in their project proposals, they are Sile, Durusu, Kirac and 75.Yil Mahallesi. The common geographical similarity of all potential project locations is being at the periphery of metropolitan Istanbul. The UA project mentioned here officially called "Project for Enabling Food Security and

² Established in 2006, Volunteers for Social Development Association also carries out project called 'Sustainable Land Management in B.Cekmece Water Basin' supported by UNDP Global Environmental Fund, Small Grants Programme.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

Employment for Groups Under Risk by Urban Agriculture" briefly "Gurpinar Urban Agriculture Project" has started in Gürpinar settlement, Buyuk Cekmece district of Istanbul. Project aims to alleviate urban poverty caused by migration to periphery of Istanbul, by functioning UA. Project financed by the EU The Central Finance and Contracts Unit (CFCU), controlled by 'Turkey Job Institution' (Turkiye Is Kurumu), hosted by Gurpinar Municipality, Istanbul and managed by 'Accessible Life Association'. RUAF, and ETC Foundation³ Netherlands has technically being supporting the project. Turkish summarized version of International Urban Agriculture Magazine 'Kent Tarimi' has also been published with the kicking-off the project.



Figure 4. Gurpinar Urban Agriculture Project participants in the field.

Project methodology was declared as "community based development" and phases are preparation, training and capacity building, implementation (cultivation), and monitoring. Within three months preparation phase the major important goals achieved are both hard and soft ones. Hard goals related to land itself includes; land allocation (Gurpinar Municipality as a first level municipality provided 2,5 hectare -6,17 acres- land to cultivate) and enabling accessibility in terms of road infrastructure, opening of drainage channels, training center and project office has set up on 120 sqm -143 sq yard-. Soft achievements are related to training issues including project demonstration to local authorities and people, selection of trainees and trainers, therefore, more importantly changing the land use type of the project area in Master Plans (zoning plans) as "Urban Agriculture Training Zone" that is probably the first introduction of UA in to urban planning in Turkey. Training period captured the topics of 'Capacity Building', 'Applied Composting', 'Theoretical and Applied Agricultural Techniques'. In the implementation phase course attenders have trained within an inter-disciplinary approach, and than cultivation has started. The project is monitored to the project partners on a regular basis. Local media has interested in this action.

³ **ETC**-Urban Agriculture is one of the leading institutes in the world in the field of urban agriculture and related issues of recycling of urban organic wastes and waste water in agriculture, urban food security, peri-urban land management and urban greening. ETC provides assistance to organisations involved in studying urban and peri-urban agriculture, designing policies and planning and implementing projects on urban and peri-urban agriculture and food security. ETC assisted in the establishment of regional resource centres on urban agriculture and food security in the context of the major RUAF programme (<u>http://www.etc-international.org/areas-of-expertise/urban-agriculture-and-food-security/</u>)



4. Concluding Remarks: Challenges and Needs for Capacity Building

This micro scale realization of an UA project has seen as a step for the first aim that is achieving a metropolitan scale projects and integration, adaptation and acceptance of UA by local urban development polices. On the other hand, the importance of the role of agriculture seemed to be understood by planning authorities. The evidence of that can be found at the metropolitan planning activities and ratified 1/100 000 scaled Istanbul Environmental Master Plan in 2006 in which, that scale holistic plan has not been produced since a decade in the City. We see new legends like ETTA⁴ (Ecological Toursim and Agricultural Zones) and TPA⁵ (Agricultural Planning Zones) functions at the peripheries of the metropolis in both continetal part. This shows the tendancy of metropolitan authorities in terms of planning. Nevertheless lower scaled Master Plans should also operationalize these land use decisions and action plans at local level should be prepared and implemented in order to achieve the sustainability objectives defined .

It is accepted that the introduction of 'Organic Agriculture Law' No.5262 in 2004, and issuing of related regulation 'Code on Principles and Implementations Related to Organic Agriculture' in 2005 as opportunity for UA activities on legal basis in Turkey. Furthermore, increasing popularisation of the concepts such as 'ecology', 'eco-tourism', and 'ecological agriculture' in Turkey are seem to provide legitimate background for demand side, but more importantly contribute awareness creation for local decision makers that have legal power to guide urban development. On the other hand debates about the EU's Common Agricultural Framework has been going on in Turkey as a limitation of national agricultural policy which has serious doubts and realisation problems. From international co-operation point of view, the UA project we described briefly is an encouraging example for future actions. We do observe that local capacity of NGOs and municipalities are need to be built in order to handle more precise projects.

The capacity areas addressed at the local governments may not directly to the UA concept itself, because the issue is more related to project management and understanding of sustainable urban development. So if the capacities of municipalities at both metropolitan and local levels about urban policy co-ordination, global agenda on urban management targeted to the technical staff and top management might be more efficient rather than formulating projects specifically on UA.

That is also appropriate to the philosophy of capacity building, that is different from capacity development or increase, which first we need a base, a foundation to build.

⁴ in Turkish ETTA (Ekolojik Tarim ve Turizm Alanlari)

⁵ in Turkish TPA (Tarimsal Planlama Alanlari)



References and Resources

Belevi, H., and Baumgartner, B. (2003) A Systematic Overview of Urban Agriculture in Developing Countries from an Environmental Point of View, *International Journal of Environmental Technology and Management*, Volume 3, Number 2, pp.193 – 211

Bills, N.L. (1991) Urban Agriculture in the United States. Cornell Agricultural Economics Staff Paper No. 91-21

Brown, K.H., and Carter, A. (2003) Urban Agriculture and Community Food Security in the United States: Farming from the City Center to the Urban Fringe, Community Food Security Coalition's North American Urban Agriculture Committee

ETC International Group, Official Web Site [online] Available from: http://www.etc-international.org/ [accessed: 02.07.2006]

Federation of City Farms and Community Gardens, Official Web Site [online] Available from: http://www.farmgarden.org.uk [accessed: 18.04.2006]

Hynes, H.P. (1996) A Patch of Eden: America's Inner City Gardens, Chelsea Green Publishing Company

Hubbard, M., and Onumah, G. (2001) Improving Urban Food Supply and Distribution in Developing Countries: The Role of City Authorities, *Habitat International*, 25, pp. 431–446

Istanbul Metropolitan Municipality (2006) 1/100 000 Scaled Istanbul Provincial Environmental Master Plan Report, Directorate of Urban Planning, Istanbul Metropolitan Planning and Urban Design Center (TR)

Kaufman, J. (1999) Exploring Opportunities for Community Development Corporations Using Inner City Vacant Land for Urban Agriculture, University of Wisconsin-Madison

Kaldjian, P.J. (2004) Istanbul's Bostans: A Millenium of Market Gardens, *Geographical Review [New York]* Vol. 94. No. 3. July 2004. p. 284-304

Korkmaz, Y. (2006). *Personal communication and interview*. (Volunteers for Social Development Association) November 24th, Istanbul (TR)

Nugent, R. A. (1997) The Significance of Urban Agriculture, Canada's Office of Urban Agriculture, City Farmer, Canada

Mougeot, L.J.A. (2005) Urban Agriculture: Basic Concepts, in Growing Cities and Food Problem: Urban Agriculture on Policy Agenda, ed. de Zeeuw, UYD, Istanbul

Patel, I. C. (1996) Rutgers Urban Gardening: A Case Study In Urban Agriculture, *Journal of Agricultural and Food Information*. Vol. 3, No. 3, pp. 35-46. 1996

Platt, R. H. (2003) Holly Whyte: Visionary for a Humane Metropolis , *Land Lies*, Lincoln Institute of Land Policy, January

RUAF Foundation (Research Centers on Urban Agriculture & Food Security) Official Web Site [online] Available from: http://www.ruaf.org/ [accessed: 24.05.2006]

RUAF Foundation and IDRC (2006) Cultivating Inclusive Cities: Multi-stakeholder Policy Making and Action Planning for Urban Agriculture and Food Security, Networking Event Session Report, World Urban Forum III, 2006

School Farms Network (2006) School Farms: A Vital Resource, Federation of City Farms and Community Gardens - Department for Education and Skills, Growing Schools Programme, Bristol, the UK



The Ecological Cities Project Web Site [online] Available from: http://www.ecologicalcities.org/ [accessed: 28.04.2006]

Trauger Groh, T. ve McFadden, S. (1997) Farms of Tomorrow Revisited: Community Supported Farms - Farm Supported Communities, Biodynamic Gardening and Farming Association, Inc., Kimberton, PA

UNDP (1996) Urban Agriculture: Food, Jobs and Sustainable Cities, United Nations Development Programme (UNDP) Publication Series for Habitat II, Volume One

University of Massachusetts, 2005. *The Humane Metropolis* [DVD]. The Ecological Cities Project, University of Massachusetts, USA

Urban Planning Directorate (2006) Analytic Study on Agricultural Sector for Investigating, Research on Spatial Dimensions, Growth, Strategy Development and Potentials for Planning, Istanbul Metropolitan Municipality (TR)

UYD (2005, 2006) Gurpinar Urban Agriculture Project Progress and Final Reports (TR & ENG)

Viljoen, A., Bohn, K., Howe, J. (2005) CPULs: Continuous Productive Urban Landscapes: Designing Urban Agriculture for Sustainable Cities, Elsevier, Amsterdam

World Bank (1984) Urban Agriculture (UNDP/GLO/84/007) Division for Global and Interregional Programmes (DGIP), Infrastructure and Urban Development (INU)



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



USER DEMANDS FOR SUSTAINABLE HOMESERVICES AN AUSTRIAN SURVEY

Thomas MADRITSCH

University of Applied Sciences KufsteinTirol thomas.madritsch@fh-kufstein.ac.at

Competition in the housing market is increasing. For involved organisations there are various ways to meet this competitive challenge. One of them is providing Homeservices to the residents of buildings. The principal target groups of this survey were the residents, the building operators, and the service providers.

The main goal of the project was to clarify the demand of sustainable Homeservices with the special focus on residential buildings. Further questions were based on the services provided to the residents either by building operators or by external services providers and how the market can be stimulated in this respect. Finally residents were asked to propose new services they would like to have or use in future. The survey ends with the future developments of Homeservices and an analysis of how they can meet user demands.

BACKGROUND

Competition in the housing market is increasing. For involved organisations there are various ways to meet this competitive challenge. One of them is providing Homeservices to residents. The principal target groups are the residents, the intermediaries, such as building operators, and the service providers. Therefore the services should be offered directly to the consumers at their homes. Arising from this idea is the definition of a Sustainable Homeservice as a service that is offered to residents of residential buildings, directly or via an intermediary organisation. This service contributes positively to the sustainable development in its three dimensions: the environmental, social, and economic dimensions.

This publication is a small part of the European project about Homeservices – Homeservice: Benchmarking Sustainable Services for the City of Tomorrow; Funded by The European Commission Research Directorate-General within the framework of the programme "The City of Tomorrow and Cultural Heritage". The following six European countries were involved in this study: Austria, Germany, Netherlands, Spain, Finland, and Portugal. A special emphasis was placed on the assessment of the cities of Vienna and Kufstein and the recommendations for the building operators. In Kufstein students of the Facility Management Master's Degree Programme carried out a small version of the Homeservices project in their community.



GOALS

The main goal of the project is to clarify the demands of sustainable Homeservices in the special context of residential buildings. The principal target groups of the project were the residents, the intermediaries, such as the building operators, and the service providers. The research focused on the following service areas (see table 1)

 Table 1: Service Areas in residential buildings

- Consulting & Information
- Care & Supervision
- Leisure Time Activities
- Repairs
- Mobility & Delivery
- Safety & Security
- Supply & Disposal

Further questions were based on the services provided to the residents either by building operators or by external services providers and it was analyzed how the market can be stimulated in this respect. Finally users were asked to propose new services they would like to have or use in future.

Definition of service

For a better understanding the following definition of service is used in this study. Services differ from products in four main respects. First, (1) they are intangible, and (2) in many cases service operations, production and consumption cannot be separated. Customers are involved and participate in the production process (e.g. personalized energy consulting for the residents). (3) Services are experienced differently by different customers (for instance, customers who cannot distinguish physical goods, e.g. the TV set of the same production line, will normally be able to distinguish services, e.g. the different maintenance persons of the maintenance firm). Finally (4), services are perishable, i.e. they cannot be stored (Baron and Harris, 2003).

Definition of sustainable Homeservices

A sustainable service in residential buildings can be considered as a service that relates to living at home and contributes positively to the sustainable development in all dimensions. However, it is difficult to fulfil all conditions of sustainability: the environmental, social and economic dimensions. Therefore it may be useful for pragmatic reasons to accept that sustainable services are services that satisfy at least two of the three dimensions. The services have been evaluated using criteria of sustainability. Thereby three questions can be answered according to the three dimensions of sustainability (see table 2).



Table 2: Dimensions of sustainability

| • | Environment | In which ways can services potentially contribute to a reduction of materials and energy use in the residential sector? | |
|---|-------------|--|--|
| • | Social | How can services potentially increase the well-being of residents? | |
| • | Economic | How can these services be organised in a way so that they are economically feasible both for the providers and users, as well as the society at large? | |

GENERAL INFLUENCE OF SERVICE MENTALITY IN HOUSING

Life style

The service mentality within most residents is not yet well developed in Austria. This results from different sources. First of all, due to the do-it-yourself attitude people have been trying to save a lot of money. As many Austrians are gardening amateurs and own their little green spaces, the do-it-yourself mentality is wide spread. Secondly, the attitude that jobs in the service sector particularly in cleaning are neither well paid nor have a good reputation is very common. Such an attitude, of course, limits the demand of Homeservices.

However, changes in life style contribute to a higher demand of Homeservices. Families with both parents working, people who are out of their homes for most of the day are often not happy doing a traditional type of household maintenance when they are at home. Also, the dislocation of families leads to a higher demand in Care & Supervision services, concerning e.g. the care for an elderly family member. Restricted free time favours only short distance to the fitness-centre, sauna or the swimming pool. Offering these recreational infrastructures improves the individual well-being and health and – as a large step further – finally results in reduced national health costs. The most important aspects for residents are increased comfort and time savings. Residents are willing to pay for that if they can afford it.

Apart from all these considerations, it should be kept in mind that Homeservices can also be provided as socially organised self-help. As it was shown in the survey, this way of supply works well in small agglomerations, and it can be easily transferred to building blocks in large cities. Only very few requirements are needed to catalyse this process. This might be a common area to allow an informal get together and a well working information flow, which might start traditionally with a residents' meeting. It will turn out that a good Homeservice supply relies on the commitment of all the three involved groups, the building operators, the external services providers and the residents. (Hrauda et al., 2004)



Economic conditions

There is a large potential target group of Homeservices, however bearing in mind the important limitation factor of money. A service must be paid for, at least partly, by the resident. Homeservices might even contribute to saving money, e.g. by car sharing. If the Mobility demand of a family is fulfilled rather by public transport and a car is only needed occasionally, then car sharing might be a lucrative alternative. Some building operators state that they can profitably provide a service centre in an area of 300-400 residents, where 10-15% of the residents use the service. In one case the housing organisation expects 60% of total residents to demand a laundry service. (Jasch, C. 2004)

Political framework

In fact, the strict Austrian industry regulations are often identified as an obstacle by the building operators. Trade licences are very strictly regulated to narrowly defined professions, which leads to the situation that a potential free-lance janitor would need 15 to 20 different licences. This would result in extremely high administrative expenses and would also cost a lot for the one who applies for these licenses. This situation is also common for external service providers, if they want to offer a bundle of services which are not closely related at first sight. But a lot of them have succeeded in overcoming this obstacle. Also building operators face this problem, but most of the building operators providing Homeservices plan to deal with it by creating a subsidiary for facility management that has the legal rights to perform certain services. (Hrauda, 1999)

RESULTS OF THE CITY OF KUFSTEIN

In Kufstein, students of the Facility Management Master's Degree Programme carried out a small version of the Homeservices project in their community during their studies at FH KufsteinTirol. Kufstein is situated in Tyrol in western Austria, close to the boarder to Germany. With its 15,000 inhabitants it has been showing a significant growth rate in the last decade.

Project design

Building operators are not playing a prominent role on the housing market. 52 interviews were carried out, most of them with young or middle aged people, nearly no elderly people (over 65 years) were interviewed. In the sample 21% were single households and 42% were three-to-four-person households. Their service demand contains no extraordinarily surprising results. They gather information from the notice board of the building manager and are interested in information on waste prevention. So far they live in multi-dwelling buildings and benefit from janitor services. Infrastructure for Leisure Time Activities is common municipality space and often used.



Results

Very often, demanded services within the service area Repairs are the preventive inspections and the repair service that are recommended for the buildings. More than half of the interviewed residents use parking lots for their cars and bikes or a bicycle storage room. The use of this infrastructure is for free. Safety & Security services hardly exist, even infrastructure like evacuation light, which should be mandatory, is installed only in a few cases. Apart from the basic supply with water and electricity, emphasis is placed on waste management. Waste collection areas for separate recycling containers are frequently used. Improvements and extra services are demanded in the area Safety & Security.

Additionally, some residents would like to have a helpdesk, were they can find a trouble shooter in case of problems concerning the building. They can imagine paying 20 to 50€ per month for this service. Regarding the services offered by external service providers, it turned out that there is a rather personal, informal contact between providers and residents. This leads to "tailor-made" solutions that fulfil the individual needs of the clients. This mentality is typical for cleaning, pet care and Mobility services.

Furthermore, there is a well developed network of subcontracting companies that provide services in the areas Care & Supervision, Supply & Disposal and Energy and Environment Consulting. Surprisingly, the first contact between service providers and residents takes place via internet platforms and other IT applications. Only in a second step or in case of a personal service a face-to-face contact between the involved parties is established. This is an unexpected result which might be linked to the age of the interview sample.

As Kufstein is a rather small town, a lot of service providers emphasise personal contact as the most important marketing instrument. Service providers that supply Care or Cleaning services primarily rely on that. However, in the technical field (energy supply and consulting, maintenance, repair), where only commercial providers supply services, traditional marketing instruments are favoured.

A significant result of the survey was the trend that the larger the service offer the more innovative the providing company is. A good example is the Kufsteiner Stadtwerke (local utilities) which at the moment – apart from their core business as an energy supplier –is also step by step providing waste management services to the municipality.

At the Facility Management Congress in Vienna the participants were asked on their attitude concerning Homeservices. In this workshop, it turned out that there is a general interest in Homeservices (Jasch, 2005).



Г

International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

٦

Table 3: Strengths/Weaknesses and Opportunities/Threats in Austria

| Strengths External service providers look for market niches, where they can offer their services. They also expect that standardised product service packages would have a good opportunity. Residents want to have quick solutions for problems that occur in the dwelling | Weaknesses External service providers fear to invest in workers with special qualifications. The service supply demands high flexibility which is often limited by the regulated working hours. Also, the restricted Austrian system of trade licences is a hindrance. Residents are aware of the costs for using the services. |
|---|--|
| Opportunities Building operators suppose that by offering Homeservices they can make their buildings more vivid and avoid living silos. External service providers can imagine offering additional services that are not their core business. Finally the residents assume a stronger social connection that contributes to a better "ambiance" in the building. | Threats Building operators see themselves forced to maximise the rentable area in a building so that there is no space left for common rooms. For external service providers, it is very difficult to estimate the consumers' response to new service and their acceptance of it. Also the release of a new service on a rather small market causes costs. Finally some residents fear fraudulent intentions of services providers. |

New services

Within the study, the residents' attitude was surveyed with the aid of a questionnaire which was based on the existing Austria list. To capture the residents' ideas, they were asked to propose new services they would like to have and use. These proposals are only made according to their interests and ignore the costs for them. Table 4 shows the most frequently mentioned new services that are not part of the Universe Austria so far.

Table 4: New services in relation to the country (Hrauda et al., 2004)

| Vienna | Amsterdam | Bilbao | Helsinki | Lisbon |
|-------------------------------|--|---|---|---|
| Library on wheels | Restaurant with low prices | Improved service information | ADSL-internet connection possibilities provided by the housing organisation | Wood cellar |
| Wake-up call | Windows cleaning (tall buildings) | wider range of services at common areas of the building | Possibility to buy repaired used household appliances | Home support done by the parish |
| Motorbike sharing | Better door lockers | improved internet security | Cash dispenser at building | CD / DVD rent with home delivery |
| Dry cleaning home delivery | Car parking facilities for short time periods | | Janitor for the neighbourhood | neighbourhood library |
| Bike sharing | | | Monitoring and optimisation of building automation | Information on selected cultural events |
| | | | Recycling market | Improve the neighbourhood security |



As the enumeration is rather scattered, it is difficult to find a common trend in what residents might prefer throughout whole Europe. This overview shows clearly that the residents' interests are very much linked to the current national housing situation, which differs a lot in the participating countries.

Therefore, a service that is common in Vienna like for example a recycling market is a desired service in Helsinki. Also bike sharing that might be quite usual in Amsterdam is a new idea for Vienna. Within the national proposal the service ideas are wide spread, coming from nearly all service areas. There might be a trend towards mobility–linked services in Austria with the motor-bike and bike sharing idea and a tendency to repair–linked services in Finland with the recycling market and the possibility to buy repaired used household appliances. But overall, residents are rather creative in thinking of new services. (Jasch, 2004)

FUTURE DEVELOPMENT OF HOMESERVICES

Finally there are some theses that consider a potential development of Homeservices in the future. (Hrauda et al., 2004) **The design of the building and its common facilities define a part of the Homeservice demand.** In fact the design of a building is very important for the provision of Homeservices. The availability of common facilities is directly linked to a service offer. This includes of course leisure time facilities that have already been described sufficiently. But it also includes the fact that empty space is available for different uses. One example is the delivery service without the recipient being at home. Therefore there need to be drop-off boxes. In the case of food delivery, the drop-off boxes need a cooling facility. However, if nobody thought of this kind of service during the construction phase, legally there will be no space available to place these boxes. So already when planning and designing a building, the architects as well as the building operators should reflect upon possible Homeservices.

Homeservices are marketing instruments for building operators to help sell/rent the dwelling.

Homeservices are an instrument for client integration and satisfaction. They do not necessarily make profit themselves, but increase profit in general for the building operator as they prevent problems. Only few building operators in Austria have already incorporated the Homeservice concept as part of their company philosophy. The same applies to the value of services as a marketing instrument. This is due to the fact that there is nearly no market pressure for the building operators, and that in large parts of the country they do not play an important role, as most residents live in owner occupied one-family houses. Therefore this thesis was proven within best practice case studies, but does not reflect the average Austrian situation.

Only services that provide more comfort have a chance.

Although it is a little disillusioning, already now, the most important feature to demand Homeservices is the added value of comfort. This tendency will get even more prominent in the future. It is a relict of the early "eco-movement", that services are often only acceptable from the environmental point of view, if it is linked to renunciation of some sort. This slogan usually does not attract anybody anymore nowadays.



An important way to promote sustainability is to address the already existing services and their providers.

Of course when entering the market with a new service, one can design its supply already in a sustainable way. However, this might be a disadvantage, because eco-efficient or sustainable services tend to have the reputation of being more expensive than "normal" services. So the easier way to go is to address existing services, and assess how they can be made more sustainable. For example, all services that are linked to transport can be improved by changing the type of vehicle. Also, services in the service area Supply & Disposal possess a high potential of sustainability. It is the advantage of the Sustainability Evaluation Tool that a single service can be evaluated in all three dimensions with several relevant criteria. They can clearly show an improvement potential to make the service more sustainable.

Homeservice demand is linked to the surrounding infrastructure.

The demand of Homeservices by building operators is influenced by the offer of external service providers that have their shops within walking distance to one's home. If there is a rich variety, it is not beneficial for building operators to offer the same service that already exists. The building operators will only succeed with new service ideas, particularly if they make use of their contact to the residents. Therefore, at the moment, offers like service centres are very popular. Apart from that, building operators are forced to offer services that the municipality stopped providing due to poor regional planning in the city suburbs.

Homeservice demand is linked to the personal living situation.

There is a close link between the personal living situation and the demand of Homeservices. However, it does not say anything about the actual use of the services. Residents who do not spend a lot of time at home due to work, earn a good salary, and want to have nice and cosy homes when they return, the demand for Homeservices is high and the services will be used a lot. For residents who need constant care for a sick family member and only earn a low salary, the demand for Homeservices is also high but the actual use will be rather low due to the costs.

Homeservices help maintain existing workplaces and create new jobs.

Homeservices can maintain existing workplaces as well as create new jobs. However, particularly for the latter, subsidies from the national employment agencies are necessary. This assumption is already proven by service providers like R.U.S.Z. or Sozial Global offering Homeservices and creating new workplaces with the support of the employment agencies. Many of the Austrian best practice examples stem from projects that were cross-funded by the employment centre of Vienna. This is also the most important stimulating option for the municipality in order to increase Homeservices at the same time.

Homeservices create additional profitable income.

The assumption that Homeservices directly create additional profitable income was not proven. However, from the interviews with building operators it became clear that even though the Homeservice supply is not an instant gold mine, they cover their costs and more importantly help prevent serious costs arising from social problems. Indirectly, Homeservices contribute to the companies' profiles by increasing customer satisfaction and by making the dwelling more attractive.



REFERENCES:

Baron, S. & Harris, K. (2003): Services marketing. Text and cases, Houndmills: Palgrave Gaterleben, B. (2001): Sustainable household consumption and quality of life: The acceptability of sustainable consumption patterns and consumer policy strategies. International Journal of Environment and Pollution 15(2): 200-216.

Halme. M., Jasch, C. & Scharp, C. (2004): Sustainable Homeservices? Which services enhance ecological, social and economic sustainability of households

Hrauda, G., Jasch, C., G. & Puhrer, J. (2004):. Sustainable Homeservices, Country Report for Austria, Institute: Institute for Environmental Management and Economics

Hrauda G.; Jasch C.(1999): Eco-Services Bericht Österreich. Länderbericht Österreich zum Projekt Eco-Services for sustainable development in the European Union. Erschienen als Band 27/98 in der Schriftenreihe des IÖW Wien sowie als Band 8/99 in der Schriftenreihe "Berichte aus Energie- und Umweltforschung" des BMWV

Jasch, C. & Madritsch, T. (2005), Sustainable Homeservices, Nachhaltige wohnungsnahe Dienstleistungen, Chance für die Wohnungswirtschaft, Kufsteiner Hefte 2005, ISBN 3-8334-3070-2

Lorek, S. (2002): Indicators for environmentally sound household consumption. Paper presented at the Workshop on Lifecycle Approaches to Sustainable Consumption. Laxenburg, Austria, Nov. 22.

OECD (1999.): Towards more sustainable household consumption patterns: Indicators to measure progress. Environment Directorate. http://www.olis.oecd.org/olis/1998doc.nsf/linkto/env-epoc-se(98)2-final



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



ECONOMIC DEVELOPMENT WITH FLEXIBLE EXCHANGE RATE REGIME :TURKISH EXPERIENCE

Ayhan AYTAC, Fatma CESUR

Trakya University, Faculty of Economics and Administration Sciences, Department of Economics, Edirne-TURKEY, Trakya University, Faculty of Economics and Administration Sciences, Department of Economics, Edirne-TURKEY, aaytac@trakya.edu.tr,fatmacesur@trakya.edu.tr

Most of countries and especially emerging or developing countries have been focused on Economic development which is concerned with employment, economic stabilization and wealth of society. Therefore economic policy makers deal with several economic policies and cautions to reach top economic development level. One of the major tools is exchange rate regime for providing stable economy. Exchange rate regime is also getting more important for the countries which have higher degree of openness.

Turkey, which is one of emerging countries, has also a great problem about economic stability. Unstable economy has major effects on macro economic indicators as well as micro economic indicators. After 2001 economic crisis in Turkey, Turkey has begun to apply the flexible Exchange rate regime to realize the economic and exchange rate stability. There is a great problem in this stage: "Could only flexible exchange rate regime be enough to provide economic stability to reach higher economic development level"

Our paper analyses the question in the view of Turkish experience by using several ratios and data sets. And we have also exposed the theoretical approaches and vital important economic instruments for the aim of economic development

Key Words: Exchange rate rejimes, Growth, The effect of flexible exchange rate policy

INTRODUCTION

Turkey, which tried to adopt an outward-oriented economy with January 24, 1980 decisions, should take measures in order to understand the effects of the changes that emerged in the framework of international flexible exchange rate regime and reduce the negative effects. An outward-oriented economy refers to an increase in the movements of goods-services, capital and labor between the outside world and Turkey and means that these factors are influenced more by the changes in the outside world. Each of the big crisis which occurred due to the fluctuations in the international capital movement since 1994 (1994, Mexico; 1997 Thailand, Indonesia, Korea; 1998 Russia and Brasília and 2000 Argentina and Turkey), in some way, grew out of the implementation of fixed exchange rate policies. Also, the countries which did not implement fixed exchange rate policy (South Africa, Israel, Mexico and Turkey) could avoid the crisis which affected the rising market economies with fixed exchange rates.



Although it is difficult to suggest a specific exchange rate regime looking at the economic structures and indicators of countries, the general trend observed in the world is a transition from fixed exchange rate regimes towards flexible exchange rate regimes. Some elements that effect economic policies can depend on the trends (Rodrik; 2000, 15), so does exchange rate policies. Short durability of fixed exchange rate regime and its tendency towards crisis is accepted as the advantage of flexible exchange rate regime. In developing countries where financial system is being freed, flexible exchange rate regime is adopted in more and more countries since it has some advantages.

Floating Exchange Rate Regime

Complexity and chaos which is seen in the international money market in the early 1970s led countries to search for new monetary systems. Due to the problems emerged in fixed exchange rate regime, providing a new mechanism in which the exchange rates can operate on their own in accordance with the market conditions became dominant. Such a requirement that emerged in the international economic system made "Flexible Exchange Rate Regime" current since the collapse of the Bretton Woods System. Flexible Exchange Rate Regime is a system in which "exchange rates are determined daily in the exchange market by demand and supply forces and which functions as a security valve in outward-oriented economies" (Caramazza-Aziz: 1998). In other words, Flexible Exchange Rate Regime is a system in which there is no state intervention in determination of exchange rates, exchange rates vary depending on the market conditions and are shaped in the framework of equilibrium of supply and demand of foreign exchange.

Devaluation and revaluation in fixed exchange rate regime are substituted by changes in foreign exchange prices and the concepts of loss and gain in value in Flexible Exchange Rate Regime. Accordingly, "when domestic currency becomes cheaper in relation to foreign currencies, it loses value and when it becomes more expensive, it gains value". (Dornbusch, Fischer, 1994).

According to the IMF reports, countries made an effort to adopt Flexible Exchange Rate Regime gradually by implementing mixed exchange rate regimes. While current exchange rate regime in approximately 90% of Developing Countries was Fixed Exchange Rate Regime in 1975, a vast majority of these countries adopted Flexible Exchange Rate Regime in the middle of 1990s (IMF, 2003). The factor which leads countries to adopt Flexible Exchange Rate Regime is that it provides the political authorities with freedom in the issues related to domestic economy, besides the noncomplex operation of the system. Additionally, "Flexible Exchange Rate Regime enables political authorities to control their own money supply and use this opportunity for their political purposes" (Gregorio-Tokman: 2004).



Advantages of Flexible Exchange Rate Regime

Recently, the discussions in developing countries and rising economies are intensely on exchange rate policy options and the preferences of the said countries are either Flexible Exchange Rate Regime or Fixed Exchange Rate Regime, which are the two main regimes (Köhler, 2001). The most important factors that influence the exchange rate regime preferences of both political and economic authorities are the advantages and disadvantages of the said regimes. So, we can summarize the advantageous aspects of Flexible Exchange Rate Regime as follows.

The most evident and noteworthy characteristic of Flexible Exchange Rate Regime is that exchange rates are determined in the market by market forces and accordingly, the foreign trade equilibrium is achieved easily and less costly within this operation mechanism consequently, the country will not allocate time and resource for foreign trade equilibrium issue, will prioritize national goals such as stability of prices, development and income distribution and will be able to implement domestic policies freely (Vuletin:2004).

Governments avoid making exchange rate adjustments on time in Fixed Exchange Rate Regimes since it will lead to loss in reserves. This situation causes speculative attack, which is the model developed by Paul Krugman. In Flexible Exchange Rate Regime, the adjustment mechanism operates freely in the market in accordance with demand and supply equilibrium. Consequently, besides prevention of a speculative attack caused by disequilibrium in exchange rates, since a state intervention in exchange rates is not necessary, no reserves will be lost. In this context, problems such as deficient or excessive valuation of exchange rates are solved within the system. This can make the possible wrong exchange rate preferences of political authorities and possible problems that may occur in foreign trade equilibrium because of these preferences ineffective.

In Flexible Exchange Rate Regime, the central bank does not make large scale interventions in the market and it does not aim at influencing the determination of the exchange rates. However, when there are excessive fluctuations it makes small scale interventions for the stability of the market. Therefore, the Central Bank operates with smaller amounts of foreign currency reserves within the said Regime (Dornbusch, Frankel 1989). Another advantage of Flexible Exchange Rate Regime is the independence and efficiency that it provides for the political authority in monetary policy (Murray, 1999). For example, an anti-inflationist policy implemented in order to restore balance of trade will increase the value of domestic currency. While this situation has a negative effect on export, it will soothe the inflationist pressure on domestic prices through increasing import. Another advantage of Flexible Exchange Rate Regime is its performance against the fluctuations in foreign markets (Licci: 2006). Flexible Exchange Rate Regime is really more successful than the other regimes in adapting to the sudden and adverse movements observed in foreign markets and massing the negative effects of these developments (Frankel, 2002). The most striking example of this situation was observed in the Asian crisis in 1997-98. Because, the countries which get out of these crisis with the least losses were Singapore and Australia which adopted Flexible Exchange Rate Regime and whose currency was fluctuating freely and Taiwan which had enough foreign exchange reserves. Consequently, free fluctuation of exchange rates can function as a shield which protects an economy against world crisis (Frankel: 1999).



Flexible Exchange Rate Regime "enables world trade volume and distribution of resources to reach the optimum level while contributing to the formation of an international specialization model in the World economy which is also compatible with the Comparative Superiority structure by enabling exchange rates to orient towards long-run equilibrium level" (Seyidoğlu: 1993).Because, the countries which get out of these crisis with the least losses were Singapore and Australia which adopted Flexible Exchange Rate Regime and whose currency was fluctuating freely and Taiwan which had enough foreign exchange reserves. Consequently, free fluctuation of exchange rates can function as a shield which protects an economy against world crisis (Sachs: 1999).

Disadvantages of Flexible Exchange Rate Regime

Besides the advantages mentioned above, the said Regime leads to some dissonances and problems in the economy. Disadvantages of Flexible Exchange Rate Regime are summarized below as main headings.

Although free fluctuation of exchange rates within the said regime is one of the main characteristics of this exchange rate regime, a large scale fluctuation in exchange rates causes uncertainty in markets. This situation plays a negative role in the determination of prices by exporter firms. When the exporter firm considers exporting goods to foreign markets to be a highly risky commercial activity, it will engage in a risk premium obligation to eliminate this risk. Consequently, as a result of the effect of this cost on prices, the foreign demand for its will decrease and foreign trade volume will decrease in parallel with it (Bacchetta-Wincoop, 2002,). The chaos in prices and the possible contraction in foreign trade volume that it may lead are accepted as one of the objections to the Regime. In order to reduce these problems and risks which is especially encountered by exporter firms, some innovations were made in the financial system such as Forward, Futures, Options and Swap.

Another criticism regarding the regime is related to the "elasticity" issue in the exchange market. Because, according to the people who stated their opinions on this issue, foreign exchange demand elasticity is not high but low. Therefore it is not likely to provide stability in the market.

Another disadvantage is the limited success of Flexible Exchange Rate Regime in developed countries. Weak financial systems and underdeveloped countries are ineffective in fighting against and adapting to the large scale exchange rate fluctuations that occur in Flexible Exchange Rate Regime (Bailliu- Lafrance-Perrault, 2000). This may lead to disorders in the macroeconomic indicators of the said countries. It has been discussed that Flexible Exchange Rate Regime is does not fit especially underdeveloped and developed countries which are in foreign debt of foreign exchange and it even worsens the foreign debt burden of the system. Another objection to the Regime is related to foreign exchange speculation and the attitudes of speculators.Briefly, it is stated that speculation should not cause instability as Friedman argues; it should provide stability as in Dornbusch's Overshooting Model (Dornbusch-Frankel: 1989). Besides, speculation that causes instability is not peculiar to Flexible



Exchange Rate Regime. Such attitudes seen also in Fixed Exchange Rate Regime were observed in Latin American countries. With a study by Krugman, the expectations towards whether Fixed Exchange Rate Regime could be sustained dried the reserves of the country as a result of increasing foreign exchange demand and collapsed the Regime (FRBSF:1996). As it was mentioned before, Flexible Exchange Rate Regime provides political authorities with flexibility and freedom in monetary policies. According to critics of the regime, this situation will lead to value losses in domestic currency via monetary enlargements in the economy and lay the groundwork for inflationist atmosphere (Kuzey:2001). This situation will absolutely cause disequilibrium in balance of payments. In this way, they try to disprove the argument that the Regime will provide equilibrium in balance of payments automatically. Transition Process of Turkey to Floating Exchange Rate Regime

Turkish economy, which experienced several problems due to both domestic and external reasons especially in last ten years, implemented a stability program, which used foreign exchange as an anchor, making an agreement with the IMF at the end of 1999 regarding the solution of the inveterate high inflation problem due to the previous unsuccessful stability policies. Due to the rapid decrease in inflation in 2000, gradual increase of demand in proportion to inflation rate and no real increase in exchange rates, domestic currency gained value. In parallel with these developments, enlargement of imports and gradual decrease in import coverage of exports created pressure over economy. Consequently, restriction of money supply and prioritizing anti-inflationist program in the context of the stability program implemented in 2000 increased TL's foreign value (Aytaç, 2004, p.137). This situation relatively cheapened imported goods and, in a way, caused exporter Turkish firms to suffer in terms of price competition while encourage import. Foreign trade deficit was 26, 7 billion USD in that year.

Incomes from privatization that are expected to step in financing the foreign trade deficit, due to the failure in making desired and expected privatizations, speculations over applicability of current exchange rates and regime and a large scale capital escape from the country began. After the political crisis at the end of February, 2001, equilibrium in markets disappeared completely, foreign exchange demand increased rapidly, overnight interest rates reached %7000. Low foreign exchange reserves of the country reduced the power of monetary authorities in maintaining flexible exchange rate regime.

All of these developments led the government of the day to meet with the IMF once more and choose the free exchange rate regime which suggests leaving exchange rates free. With the last crisis, Turkey removed the inspection over exchange rates, allowed exchange rates to be determined by the market and oriented towards tight monetary and financial policies. In this case, the Central Bank adopted the principle of constituting policies on both interest rates and exchange rates. Exchange Rate and Growth

The idea that international trade is the engine of growth goes back to Adam Smith. In Turkey (especially since 1960s when planned economy period began) until 1980s, as a requirement of the closed economy based on import-substitution, tight foreign exchange regime and fixed exchange rate regime was implemented.



As a result of the failure of the economy to get rid of the foreign exchange bottleneck after the economic crisis experienced at the end of 1970s, a radical change was made in the economic policy after 1980 and a new economic policy was adopted which was weightily market economy, based on exports and outward-oriented. The main aim of this policy was having a foreign exchange producing mechanism within the economy. Therefore, determination of exchange rates by market mechanism was adopted in principle. For this purpose, the Central Bank began determining exchange rate on a daily basis as of May 1, 1981. Since the beginning of 1984, in parallel with liberalization of foreign trade, foreign exchange regime was also liberalized to a large extent. With significant changes made between 1984 and 1989, determination of the value of Turkish currency with respect to foreign currencies ascribed to the Central Bank, foreign exchange allowance and transfer transactions were ascribed to the banks and banks were allowed to use foreign exchange. With the radical changes made since 1989, liberalization of foreign exchange regime continued increasingly and thus Turkey's financial system was integrated to the international financial system. The chronic inflation that was suffered for years and inefficient and unstable growth mooted the 18th stand-by agreement with the IMF in December, 1999 and decreasing inflation was associated with using exchange rate as a peg. However, the economic crisis in February, 2001 resulted in leaving exchange rate fluctuating freely in markets and adoption of flexible exchange rate regime (Y. Akyüz, 2004 pp.5-19)

The segments which advocated financial liberalization argued that international capital movements would broaden the resource usages of economies, increase the investments for savings and production and thus enable high and sustainable economic growth in the long-run.

Since financial liberalization will lead to entrance of hot money and this will make domestic currency excessively valuable and encourage import and discourage export; it will cause a fragile economic growth based on import. This process which constantly increases current account deficit usually ends in a big economic crisis. Thus, growth mechanism based on entrance of hot money converts into a deep depression with escape of capital (Tobin, 1998). Since extraordinary growth of finance capital creates dependence on finance in the international arena, the crisis experiences has a contagion effect among countries.

As we have mentioned in our study, Asian countries did not left free trade policies although they experienced an economic crisis beginning from 1997until 1999. Besides, several countries in the world sign free trade agreements and develop regional economic integrations. They want to remove borders in terms of trade instead of protecting borders with high customs walls. In last years, world trade developed faster than world economy and this trend is expected to continue in next year. Today, foreign trade is accepted as one of the most important channels of benefiting from globalization and integrating with the world by developing countries. Imports create additional competition in domestic market, increases diversity of goods and the welfare of consumers increase. Exports increase the share in foreign markets and are beneficial for the businesses.



The Effect of Flexible Exchange Rate Policy in Turkey on the Economy

High fluctuating potential that emerged after the flexible exchange rate policy began being carried out is the main element in getting rid of foreign disequilibrium. When flexible exchange rate policy was introduced in Turkey, exchange rates fluctuated significantly as it was expected however after the economic units adapted to flexible exchange rate regime, exchange rates became more stable in time.

Fluctuations in exchange rates, inflation and interest rates are related with the monetary policies that are implemented regarding these parameters. Since February, 2001, the trend is that first, fluctuations increased since February and TL lost value and then it gained value. The comparisons between real effective exchange rate index based on 1995 and current exchange rate level may not give accurate results because of two reasons:

First one is the difference between the exchange rate regime in 1995 and the currently used flexible exchange rate regime. While exchange rate was determined by the Central Bank on a daily basis in the exchange rate regime in 1995, in the flexible exchange rate regime implemented in February, 2001, exchange rate is completely determined by market conditions. Determination of exchange rate prices in the market has contradictions about the criterion according to which correction should be made when real effective exchange rate is taken into consideration.

The second factor is that fluctuations in exchange rate, which can also be considered as a result of flexible exchange rate regime, are in connection with income and capital movements besides price movements. In flexible exchange rate regime, exchange rate represents not only price movements, but also the equilibrium. Therefore, the price based relationship between nominal exchange rate and real exchange rate can be misleading in flexible exchange rate regime. In fact, equilibrium is provided by fluctuations in exchange rate flexible exchange rate regime. Therefore nominal exchange rate should be considered to be real exchange rate. Moreover, fluctuating nature of nominal exchange rate can be considered as an evidence of why this exchange rate level cannot be compared with real exchange rate index. Having these explanations in mind; it is argued that associating exchange rate with real exchange rate index is not meaningful in flexible exchange rate regime. What is important in flexible exchange rate regime is the size and duration of fluctuations in exchange rates. Little fluctuation in exchange rates is the main element that provides stability in markets.

Economic authorities tried to solve the main problems listed below with Free (floating) Exchange Rate Regime which was implemented as a caution after the economic and political crisis in February:

- Preventing the depreciation of foreign exchange reserves of the country
- Controlling the foreign trade deficit
- Eliminating the problem of excessive valuation in exchange rates and having price competition advantages in export
- Preventing exchange rate-oriented speculation and speculative attacks.



The period beginning from 2001 enables us to make an evaluation regarding whether our expectations from floating exchange rate regime came true or not. So, the realizations regarding the Turkey's basic expectations can be summarized as follows:

Preventing the depreciation of foreign exchange reserves of the country; after February, 2001 crisis, when we had approximately \$ 11 billion, the state intervention in exchange rates was removed and this led to the disappearance of depreciation in foreign exchange reserves and the Central Bank has a reserve of approximately \$ 57 billion as of today. The more the foreign exchange reserves of an outward-oriented country, the less the possibility of a foreign exchange crisis is. So, we can say that the implemented exchange rate regime is successful in this respect.

Controlling the foreign trade deficit; foreign trade deficit which is one of the most important problems that carried Turkey to the crisis in 2001 increased during last 5 years despite floating exchange rate regime which was tried to be implemented after the crisis. In this context, according to TUİK, Turkey's foreign trade deficit reached \$ 35 billion 386 million as of January-August, 2006, which is interesting because foreign trade developed contrarily to what we expect from floating exchange rate regime. The expectations towards whether this foreign trade deficit can be maintained may increase fragility in markets in which speculative attack is possible. Here the main problem is why floating exchange rate failed in meeting the foreign trade deficit and preventing excessive valuation of domestic currency.

The most important factor in the formation of this table is the establishment of a single party government after the early elections held in order to refresh confidence in markets after February, 2001 crisis and the refreshment in real sector due to the positive reactions to the election results. The current economic development is based on imports because the share of intermediary and investment goods in the total imports of Turkey is above 80%. This shows an economic development fed by imports and also it is the reason of the negative development between exports and imports.

Eliminating the problem of excessive valuation in exchange rates and having price competition advantages in export; exchange rate which were left fluctuating after February, 2001 crisis rose so much that excessive valuation was eliminated, this trend continued for almost 6 months, a recession period began especially due to the positive reactions to election results and demand for foreign exchange decreased. Exchange rate which was 1\$=1.500.000 TL (1.50YTL) in July, 2001 is at almost the same level in these days. In other words, exchange rates remained almost fixed during 5 years. In this period, no effect of inflation was observed on exchange rates and the relation between inflation and exchange rates, which should be direct, disappeared. And this led to the problem of excessive valuation of exchange rates. The most important reason of increase in export despite this trend is the increased share of High-Tech products in total exports and the new markets strategy in foreign trade that was put into force in 2000. However, import increased significantly in this period when the domestic currency is excessively valuable and this situation led to a significant foreign trade deficit and current account deficit. Today, while import coverage of exports decreased below 60% in Turkey,



The proportion of current account deficit to GNP reached %-5, 90. In literature, import coverage of export less than 60% and the proportion of current account deficit to GNP between %-4 and -6 are considered to be the most significant signals of a possible foreign exchange crisis in the economy. Therefore, it is seen that the reducing function of Floating Exchange Rate Regime on foreign trade deficit did not work in last 5 years.

Preventing exchange rate-oriented speculation and speculative attacks: The most important reason of exchange rate-oriented speculation is the excessive valuation of exchange rates unrealistically. The expectations towards the impossibility of maintaining such a structure trigger speculation and this situation increases fragility in money and capital markets, primarily exchange market. In the last 5 years when floating exchange rate regime has been current, Turkish currency gained value constantly. Especially export-oriented sectors severely criticize the excessive valuation of domestic currency in several platforms. This situation may lead to an increase in foreign exchange demand in time. At this point of view, it is seen that floating exchange rate regime is not effective in adopting a realistic exchange rate policy, which is one of the main problems of Turkish economy.

CONCLUSION

Economic crisis that Turkish economy experienced with frequent intervals since late 1970'lerin occurred as a result of structural and institutional weaknesses besides wrong macroeconomic policies and their implementation. The new stability program of 1999 which used the exchange rate supported by IMF and World Bank as a peg did not yield the desired results. The crisis which first alarmed in November, 2000 and deepened in February, 2001 after the program was abandoned was not limited to the financial sector of the economy and spanned to the real sectors, which is different from the crisis in 1994 and other crisis.

The process that began in 2001 indicated that Floating Exchange Rate Regime is not efficient in solving Turkey's main problems. The reason of the optimistic atmosphere in Turkish economy despite all problems is that elimination of political instability relieved markets and made markets more dynamic. Additionally, the reason is the hot capital coming to Turkey due to the low real interest rates and direct foreign capital coming through privatization. The increasing amount of hot money in the economy leads Turkish economy to be more consistent with the international conjecture and therefore more fragile.

In conclusion, it is seen that "Supervised Floating Exchange Rate Regime" should be implemented in the current structure of Turkish economy instead of free floating exchange rate regime in order to adopt a more realistic exchange rate policy and thus the pressures that may be led by excessively valued exchange rate can be absorbed.



REFERENCES:

Akyüz Y., (2004). "Gelişmekte Olan Ülkelerde Para ve Kur Politikaları: Türkiye Deneyimi" İşletme Finans, yıl:19, sayı:224, Kasım ss.5-20

Calvo G., Reinhart C., (2000). Fear of Floating, University of Maryland and NBER, Wolf

Caramazza,F.-Aziz,J., (1998). Fixed or flexible:getting the Exchange rate right in the 1990s, Economic Issues 13, IMF, Washington D.C., April,

Domaç, Peria M., (2000). "Banking Crises and Exchange Rate Regimes: There a Link", The World Bank

Dornbusch, R.-Fischer, S., (1994). Macro Economics, Sixth Edition, International Edition, McGraw-Hill Inc, p.157.

Dornbusch, R.-Frankel, J., (1989). "The Flexible Exchange Rates Vs. Experience and Theory" Journal of Portfolio Management, Vol. 15, No.2, Winter

Frankel J., (1999). "No Single Currency Regime is Right For All Countries or at Times", NBER, Working Papers

Frankel, J., (2002). "Should Gold-Exporters Pegg Their Currencies to Gold", Study of World Gold Council, July 20, p.5.

Frankel, J., (2002). "Should Gold-Exporters Pegg Their Currencies to Gold", Study of World Gold Council, July 20, p.5.

Gregorio, J.-Tokman, A., (2004). "Flexible Exchnage Rate Regime and Forex Interventions : The Chilean Case, Economic Policy Papers of the Central Bank of Chile, December,

Güran N., (1987). Döviz Kuru Sistemleri ve Otomatik Denge, Kavram Matbaası, İzmir

H., Jonathan O., (1996). "Does the Excahanfe Rate Rejime Matter for inflation and Growth Economic Issues 2"

IMF Sees Advantages in Fixed and Flexible Currency Systems, (Çevrimiçi) http://pages.stern.nyu.edu/asia/FixFlexRatesIMFWSJ997.htm, 09.04.2003.

Inan A., (2002). "Kur Rejimi Tercihi ve Türkiye", Mart, Bankalar Birliği

Köhler,H.; "New Challenges for Exchange Rate Policy", (2001). Asia_Europe (ASEM) Meeting of Finance Ministers, Kobe, January 13

Murray, J., (1999). "Why Canada needs a Flexible Exchange Rate", Bank of Canada Working Paper, No:99-12, July

Rodrik D., (2000). Yeni Küresel Ekonomi ve Gelişmekte Olan Ülkeler, Sabah Kitapları, İstanbul

Sachs, J., (1999). "The Exchange Rate Puzzle", Worldlink, March-April

Seyidoğlu,H., (1993). Uluslararası İktisat, Güzem yayınları, Ezgi Kitabevi,

Vuletin,G., (2004). "Exchange Rate Regimes And Fiscal Performance. Do Fixed Exchange Rate Regimes Generate More Discipline Than Flexible Ones?", Econometric Society 2004 North American Winter Meetings ,No:474

Yılmaz K., Akçay C., Alper E., 2002. "Enflasyon ve Büyüme Dinamikleri" TÜSİAD



ELECTRONIC WASTE CURRENT STATUS AND MANAGEMENT PRACTICE

Suresh Chandra SAXENA

Secretary, Resource Management & Development Organization, Jaipur, INDIA scs1940@yahoo.co.in

Electronic waste, like other categories of wastes, is a generic term for the waste from obsolete and outdated computers, televisions, telephone and telecommunication equipments, Printers, photocopiers, DVD, Cathode rays tubes, Plasma display panels, electronic equipments for scientific laboratory testing and some types of lamps etc. An UNEP report in 2005 revealed that 20-50 million tons of Electronic waste is generated world wide. In America 5-7 million tones of e-waste is discarded every year. This paper describes current status of electronic wastes generation and ongoing management and handling practices. Lead, cadmium, mercury, copper, aluminium, arsenic, antimony, little precious metals and traces of rare earths or alloys are used in fabrication of electronic components, special category of plastics contains PCB and PBDE which is used for making selected body parts and the printed circuit boards and phosphorescent chemicals are coated to illuminate the surfaces. Sixty percent of total electronic waste is reported metallic constituents whereas presence of hazardous substance is three percent. E-waste trading including transboundary movement for recycles, reuse or reprocessing for metal recovery of iron, copper, aluminum, gold and others from redundant electronics, is a growing industrial activity in developing countries. Such activities are carried out with no regards to proper management, handling and disposal of hazardous residues ewaste. Environmentally sound e-waste management, through integrated life-cycle approach, is an emerging solution to this problem. Electronic industry, users, e-waste business trader, recyclers and the Government should all share the responsibilities for proper management and handling of e-waste. Initiatives taken by European Union - Directives (2004), restricting use of hazardous substances in manufacturing of electronic products, mandate manufacturer to take back obsolete products and ensure proper recycle, reuse and disposal of e-waste. Corporate example of Silicon Valley Toxic Coalition (San Francisco) initiative, for preparing directory of firms which receive and process computer reuse and recycling, is a welcome step in the right direction.

I. Introduction:

Man and machines working together for twenty 24x7 - non stop day and nights, is a reality of present era of fast life. This is evident by seeing automatic electric and electronic devices that regulate household, industry, offices, hospitals, markets, recreation-entertainment facilities, traffic, aviation, navigation, civil and security systems, to name a few. Use of electronic machines and equipments like TV, telephone, cell phone, and computers etc. has increased several folds during past decade. There has also been a proportionate increase in number of obsoletes that become outdated or almost ended their workability. A glittering side of technological advancement is that every year computers gets faster, DVD players get smaller whereas, display screens get larger. According to US Environment Protection Agency, average life span of a computer fell from 4-5 years in 1992 to 2 years in 2005.



Computers are replaced within 3 years and most of old computers end up in landfill. Barely 10 per cent of them are recycled. Mr. Gordon Moore, Intel® ex-CEO, once said that every 18 months, speed of computer will double, whereas prices will be reduced by half.

II. Brief history of e-waste:

This section presents a brief overview of advancements in electronics and applications of computer technology. Apple II, the home computer by Steve Jobs and Steve Wozniak in 1977 could store and process large amounts of information. First Personal Computer from IBM was made in 1981 and Microsoft's innovative version of Widows operating system was launched in 1985. However, PCs and personnel computing gained popularity with the help of Windows 3.0 version in 1990. Apple, IBM - Windows together developed system for digitalizing different forms of expressions – words, music, numeric data, maps, photographs, voice and videos into bits and bytes. Year 1991 saw innovative invention by Vint Cerf and Bob Kahn in the form of email, that was used for sending digital content between computers, Also, World Wide Web innovation by Tim Berners Lee, resulted in a system for creating, organizing and linking digitized documents that can be easily browsed over the Internet. Now, Internet service is available at a low cost to common people Utilization of Internet has resulted in a boom of computer and computer related technology devices in the last 2 decades.

Computer technology further advanced to make possible for a machine to talk and interact with other machine without human involvement. Data description language called XML (Extensible mark-up Language) and related transport protocol SOAP (Simple object access protocol) were created to allow any two computer programmes to exchange formatted data or documents that contain any form of information – whether billing records, financial transactions, medical record, music, pictures bank records and stock sales etc. Thus C2C (customer –to-customer) business transactions among buyer and seller without human involvement could be possible. Computer scientists from late 80s to mid nineties, continue to develop software – the operating system with improvement in hard wares. Similarly, B2B (business-to-business) transactions were possible between businesses. This allowed the high-tech industry to produce devices that found uses in nearly all aspects of life.

This reveals how fast and progressively the technique developed which compelled to bring new and newer generation of computer devices. Thomas L. Friedman^[6] remarked that 'Technologists loved the new technology things it could do, and the businessmen got excited about how much money they could make'. We have entered in the phase of digitization, virtualization and automatic transference of more and more information. Computer hard ware and soft ware go on updating to tune with out break of new and newer innovative facilities that had to be created for user. Number of old and redundant computer and their peripherals go on increasing in stock piles of e-waste every year.



III. Fate of e-waste:

Electronic waste management is an emerging global problem. Common practice of use and throw away of obsolete electrical and electronic items or dispose any where or in any manner is harmful to human health and the environment. Electronic waste alike other category of waste is generic term for the waste from electrical and electronic equipments. Main streams of electronic waste are obsolete and outdated computers, telecommunication equipments, information technology devices, photo copiers, fax machines, printers, cartridges, floppy, discs, DVDs, Televisions, cathode rays tubes, PDP (plasma display panels), electronic equipments used for scientific testing, including home appliances, CFL (compact fluorescent lamps) and high voltage mercury lamps etc. which cease to be of any economic value for owner or user. E-waste generated by individuals, such as TVs, house hold appliances as well as condemned electronic items from corporate and companies are sold to scrap traders. Significant amount of e-waste from Europe/US is also destined to countries like India and China, where they are scrapped. E-waste scrap traders and recyclers in Bangalore, Mumbai, Hyderabad and Delhi also import, dismantle to sort out workable components from redundant electronic devices and for metal recovery. The remaining waste goes into landfills.

Under 1992 Basel convention, type of hazardous waste includes electronic waste of circuit boards, CRTs, monitors, and mercury or PCB containing lamp etc. International regulations



Figure 1: Outdated electronic equipment

therefore. applicable are upon environmentally sound management of electronic waste through integrated life cycle approach and strong control over generation, collection, reception. transport (including storage, transboundary movement), treatment, recycle, recovery, reuse and safe disposal. However, e- waste trade and dumping is continued from US and Europe to Asian countries. Some researchers in US have estimated that nearly 75 percent of old computers are thrown out of use or temporarily stored for later safe disposal because of not surety about complete secured data

deletion. An UNEP study 2005^[8], revealed that 20-50 million tons of electronic waste is generated annually world wide. About 100 million PCs were in use against 20 millions in 1994. Americans alone own more than two billion pieces of Hi- tech electronics and discard 5-7 million tones of e-waste every year. Cumulative figure of obsolete PCs go on increasing and may be about 500 millions by this time. Toxic link ^[7], a Delhi based NGO estimated in 1994 that 1.38 million computers are thrown out of use every year, now there may be 2 million obsolete computers in the country. Green Peace (India) reported^[3] in 2004 that about 1100 tons indigenous generation and around 5200 tons of illegal import of electronic waste every year by the scrap traders and recyclers.



IV. Benefits of recycling e-waste:

Electronic waste material is of dual character. It is toxic and it contains valuable substances like gold and copper. Widmer et al^[9] (2005) reported that content of valuable iron, copper, aluminum, gold and other metals is over sixty percent as compared to less than three percent hazardous pollutants. Many materials are used in fabrication of electronics and some of them are toxic and injurious to health. Significant amount of Lead, cadmium, mercury, copper, aluminum, arsenic, antimony metals and alloy, pinch of precious metal of gold and traces of rare earths are common metallic ingredients. Special category of plastics containing PCB (poly chlorinated bi phenyl) and PBDE (poly brominated diphenyl ethers) being excellent insulator which do not catch fire, are used in making of body and display monitor frames, printed circuit board, chips, resister, condensers and cables etc. Lead is invariably used in soldering of electronic components. CRT (Cathode Rays Tube) computer monitors contain lead and also barium to protect from radiation. Flat-panel display computer monitors, thermostats and much medical testing equipment contain mercury. Printed circuit boards, chips, chips resisters and Infra Red detectors and the batteries contain cadmium, chromium, lead and mercury. Cell phones contain arsenic and beryllium. Compact Fluorescent Lamps (CFL) contain phosphorescent and fluorescent materials of common phosphors (calcium halo phosphate) mixed with fraction of metals like lead, antimony, manganese, tungsten and traces of other elements like Europium, Cerium and Yttrium. Mercury is used as most energy efficient and cost effective substance to glow high illumination lightning devices like CRT computer monitor, TV screen fluorescent lamps and fluorescent tubes, high pressure sodium lamps, vapor lamps and neon lamps etc.

V. Current recycling situation:

Systematic E–waste management and disposal remained unattended in the past decade for so many reasons. Perhaps, it may be due to less generation of waste quantity, non availability of standard procedure and almost non existence of stringent rules and regulations. Reprocessing of redundant computer is labour intensive costly affair in transport and storage, and takes more than thirty five hours to ensure removal of confidential and secured data from hard drive. Manufacturers do not like to go for computer recycling business though they do generate and liberate considerable amount of e- waste. Professional e-waste recyclers are deployed on contract basis. Deepali Sinha and Khetriwal^[5] of EMPA (2005) in pilot study stated that bulk users of electronics equipments such as IT companies do not know as what to do with their outdated equipments. The custom bound goods are stored by IT and communication companies in the event of no guidelines for disposal of redundant and scrapped electronic items. In under developing countries the Government there is other environment protection and pollution control rule and regulations of priorities for enforcement.



Switzerland is first country to introduce a system to deal with electronic waste in 1994. EMPA^[1], the Swiss Federal Institute for material Science and Technology and Federal Laboratories for Material Testing and Research undertook project "Knowledge partnership



Circuit boards ready for recycling

with developing and transition countries in e-waste recycling" and conducted studies about ongoing ewaste recycle system in Switzerland, China (Beijing), India (Delhi), and Africa (Johannesburg). South "Electronic Waste Guide" а knowledge base for sustainable recycling of e-waste is being developed based on experience from such studies. Observations revealed that systems vary from country to country, depending on stakeholders and socioeconomic conditions. In Switzerland. sustainable recvcle system consists of simple model links that have impacts on labour health and

the environment. In Beijing (China), e-waste is collected manually from door to door. In Beijing "Jin Huan Industry" is a registered e-waste handling and waste treatment service station. After basic sorting and dismantling, e-waste is sent from Beijing to Guang Dong and Jha Jiang in southeast china, for actual refining and metal recovery. In South Africa, general metal scrap traders also take up e-waste scrap and sell it to major waste recyclers like Universal recycling company. Recycling is done using mechanical shredders, pulverisers, rotary magnets, etc. on disassembly lines. Heavy and precious metal are shipped to European companies; steel is processed locally and non ferrous fractions thrown in landfill. E-waste trading-handling is carried out in different areas of Delhi and from different aspect of recycling. Indian recyclers currently engaged in material salvaging. In spite of the absence of proper technology, each PC component is disassembled and recycled or reused. The general practices observed in case of recycling of the most complex parts of PCs i.e. circuit boards and PVC wires, is open roasting and acid bath to recover metals. Workable components from obsolete or redundant electronic items can be processed for reuse. Manual Separation and segregation of computer monitor, monitor casing, motherboard, keyboard, floppy drive, hiindex, different components of the printer, etc is common practice of retailers and computer repair shop owners. These groups purchase only a few working chips of higher value. In America and Europe, unusable CRTs are sent to local recyclers who put freshly leaded glass in to new CRTs and export them to Asian factories which largely depend upon such parts to assemble local made TVs and computers.



VI. Harmful effects of e-waste

Rolf Widmer^[9] mentions that in under-developed countries the trading, repairing and recovering material from redundant electronic devices is a source of livelihood of urban poor.



Reuse of redundant devices

and reuse of computer Recycle peripherals, for use as raw material for metals recovery from obsolete electronic components, is although reported from few places; but it is done with little regards to safe management and handling of the toxics. The low skilled workers are not aware of risk involved in unscientific recycling of e-waste. For example, considerable amount of plastic and lead bearing waste is thrown from tiny processing units located in the backyard of house hold in residential areas get mixed with municipal waste and eventually ends its life in landfills. Dismantling, recycling or disposal of

such waste, without safe procedures can result harmful side effects. Halogenated chloride bromides (HCB), enriched special category of plastics form dioxins and furans form toxic chemicals, when combusted with copper (readily available from printed circuit boards - which acts as catalyst) during incineration process. Leachate contains lead, cadmium, mercury as pollutants which contaminate surrounding land and water resources. BAN (Basel Action Network) under UNEP^{[8],} reported that water of GUIYU in China - a booming destination of electronic waste around the world is highly polluted from e- waste hazards to the extent that fresh drinking water has to be transported from elsewhere. Thus degradation of e–waste material affects occupational health hazard and environmental pollution. Lead damages kidneys, nervous and reproductive systems. Mercury damages kidneys, foetus and impedes the brain development in children. Heavy metals toxicity for human health and injurious impacts of PCB and PBDE on environment are amply documented.

VII. Environmental friendly methods of reducing e-waste:

Recycling and reuse of e-waste is most environmental friendly, whereas the common practice of landfill disposal is the most harmful. Landfill disposal results in leakage, seepage of pollutant and vaporization of mercury type volatile substances. Open burning at low temperature causes respiratory health hazards and fly ash gets dispersed in the air. Incineration under controlling of flu gasses is better option for cable and printed circuit boards. Personnel protective cloths should be provided to workers during manual disassembling, dismantling and sorting of reusable components from e - waste. The scrap is subjected to mechanical shredders, pulverizers, rotary magnets to further separate light, heavy, metallic and non metallic fractions. Workers need improved metal recovering techniques and training.



Computer manufacturers and distributors are also advised to take back obsolete items from users and ensure their recycle, reuse and along with safe disposal of hazardous waste.

VIII. Current reduction efforts:

Another alternative is to reduce or completely restrict the use of hazardous substances in manufacturing of computers and other electronic equipments. European Union Directives to reduce and or restrict the use of hazardous substances like lead, cadmium, chromium, polybrominated biphenyls (PBB) and poly-brominated diphenyl ethers (PBDE) in making of electronic products has been in effect since July 2004. California and other states under U S, Electronic Waste Recycling Act 2003, are preparing to meet statuary requirement which includes: reduction in use of hazardous substances in electronic products and introduction of a payment system for the collection and recycling of electronic waste. Silicon Valley Toxic Coalition maintains the San Francisco Bay Area Computer Reuse and Recycle directory with details about firms and organizations that receive and process the obsolete computers, TVs and other electronic equipments. Immark® AG in Switzerland, Mirec® Group of Companies (Europe) and Matsushita® Electric in Japan are specialized companies in sorting and shredding of e-waste. Mirec® recycles wide range of CRT tubes from TVs and computer monitors whereas Umicore® Precious Metal Refining in Belgium are specialist smelting and recycling of electronic scrap. HP® (printers and cartridge manufacturer) has been recycling its outdated items since 1987. Some of these companies are also looking for partners to set up joint ventures in Asian countries like India and China. Canada, China, Taiwan, Japan, and Korea are bringing in legislation for safe end-of-life management of such products. IBM®, Intel®, Microsoft®, DELL® and AMD® are prepared for making of new generation electronics free from hazardous material. Sony®, Sony Ericsson®, Samsung® and Nokia® are committed to reducing and removal of flame retardants and other hazardous materials from their products.

IX. Efforts in India:

An agreement between Indian Government and German, Swiss E-Waste Initiative (Swiss Federal Institute for Material Science & Technology and German Technical Cooperation, GTZ) has been established in 2004. It aims to document current e-waste handling situation in major Indian cities and develop a knowledge base to mitigate the hazards of improper recycling. A National Board for Electrical and Electronic Equipment Waste constituting a group of representatives from Government, the Pollution Control Board, EEE manufacturers, importers associations and non-government organizations, has been set up to develop a comprehensive e-waste management system. The "Electronic and Electrical waste Agency" was set up in Bangalore (India) in 2005 to develop sustainable solutions, creation of awareness about e-waste management and to provide inputs related to skills and technology for recycling sector. UNEP (United Nations Environment Programme) has also established "Environment and e-waste India Project" in 2005 to reduce environmental and health impacts due to improper E- waste recycling in Mumbai.



X. Looking ahead:

Electronics manufacturers and the e-waste recyclers should take care of electronic waste generation, management disposal as envisaged under Basel convention 1992. Regulatory agencies of the government in addition to policing should also arrange training cum awareness camps for workers on safe handling of electronic waste. Taking back of obsolete electronic products and ensuring their safe disposal should be made mandatory upon industry. A viable system development for collection, transportation and storage of discarded items meant for disposal at their end, must be created. Transboundary movement of e-waste for dumping purpose should completely be banned. UNEP should generate and provide sufficient financial support to the state Governments for e-waste management, technology transfer, training and creation of awareness among e-waste scrap traders and recyclers. Prominent Non Government Organizations of area should be identified who can provide services in arranging training cum awareness camps for workers.

XI. Conclusion:

Elizabeth Grossman, an environmental Journalist, remarks in her book "High Tech Trash" that "Digital age was expected to usher in era of clean production, an alternative to smoke-stack industries and their pollutants. High-tech manufacture and disposal of digital may be sleek, it is any thing but clean. Deep within every electronic device, laid toxic metals that make up bits and bytes, a complex thicket of Lead, Cadmium, plastic and host of other harmful ingredients. Whether you sit on office desk, talk to friends on cell phone, watch TV, listen music, you believe or not you are a part of it.' E-waste management is shared responsibility – the Government, Electronic industry, traders, user/recyclers, and environmental scientists need to come together and evolve complimentary solutions that will become a reality. This will be the most effective approach to tackle this problem.



XII. References:

| 1 | | | |
|---|--|--|--|
| | EMPA (Swiss Federal Institute for Material Science and Technology) (2004) | E-waste pilot study Delhi knowledge partnership with developing and | |
| | | transition country. | |
| 2 | Envis (2006) | Trade and Environment, Jan-March 2006 | |
| 3 | Green Peace International (2005) | Recycling of Electronic waste in China and India; work place and environmental contamination | |
| 1 | European Union (2005) | Directives of European Parliament and of | |
| - | European Onion (2003) | Council on restriction on use of certain | |
| | | hazardous Substances in electrical & | |
| | | electronic equipments Official Journal | |
| | | 1 037 13/2/2003 | |
| 5 | Sinha – Khetriwal D et al (2005) | A comparison of electronic waste | |
| U | | recycling in Switzerland and in India. | |
| 6 | Thomas L. Friedman (2006) | The World is Flat: Farrar, Straus and | |
| | × | Giroux; New York | |
| 7 | Toxic link (2003) | Scropping the high tech Muth: computer | |
| / | Тохіс Шік (2003) | waste in India. | |
| 8 | United Nations Environ Programme (2005) | Annual Report on E-Waste & Trade | |
| 9 | Widmer R. et al (2005) | Global perspectives on E-waste. | |
| | | | |



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus


THE NATIONAL PARK OF KARABURUN-A POSSIBILITY TO PROTECT THE MARINE BIODIVERSITY, AND SUSTAINABLE DEVELOPMENT OF TRUISM IN ALBANIA

Liljana ELMAZI, Evelina BAZINI, Ada KERTUSHA

Faculty of Economics, University of Tirana, ALBANIA Head of Marketing and Tourism Department, Faculty of Commerce, University of Vlora, ALBANIA Pedagog, Faculty of Economics, University of Tirana, ALBANIA lilibilla@vahoo.com

In contest of the Strategic Action Program for Biodiversity protection in Mediterranean region (SAP BIO), the Albanian government has identifies and prepared four, National Action Plans, one of which is that of Karaburun Marin Park.

Albania should be involved in real actions to protect and manage the marine biodiversity, to achieve the sustainable development of truism.

The sea and more the undersea life, is unknown to humans, and as often happens in this cases it's contribution is such a small one, and not in portion with the contribution this part of the nature has in the ecosystem. This is why this Mediterranean strategic program recommends real actions.

Albania, is included in researches to identify areas with reach biodiversity, where are still living diminishing species (marine turtle, and Mediterranean seal) and their habitat, by improving not only the study techniques, but also protecting, managing marine biodiversity in ecological important areas. (Karaburun's zone, Patokut's Laguna etc). Public conscience is very important, training public and creating new relation between inters groups, in Mediterranean region.

In this article we will give some information on marine environment and its biodiversity, focused on big diminishing species, and the possibility of developing marine truism (jet)

Albanian coastline

The Albanian coastline has a total length of 476 km facing both the Adriatic and Ionian Seas. Along its length there are four small islands and one big, Sazan. The coastline is approximately 60% sand and 40% rock.

The Adriatic coastline with its sandy shores covers the area between Vlore and Shengjin with 10m isobaths extending, in most areas, more than 3 miles from the shore. Owing to a high concentration of river estuaries along this coastline the seabed is composed mostly of silt and mud washed down from the rivers, making visibility very poor.



The Ionian coastline stretches from the Greek border to Vlore and is mostly rocky with a few pebbly or sandy beaches. The Karaburuni peninsula coastline has steep cliffs with deep water close to the shoreline and several caves with open or underwater entrances.

Mediterranean monk seal

The Mediterranean monk seal is one of the most threatened species in the world and according to the IUCN Red List is "Critically Endangered (CR)" (IUCN 2000, UNEP-WCMC). Its worldwide population is estimated as between 400 and 500 individuals with the main surviving groups found in the Eastern Mediterranean (Greece and Turkey), Western Mediterranean (Algeria, Morocco) and North West African Atlantic coast (Western Sahara, Madeira). According to available information on population estimates (W. Johnson, 2005) monk seals have become extinct along the Adriatic coasts of Croatia and Albania. A recent scientific report however, suggested the possible presence of at least one monk seal along the Croatian coastline. During 2005, a monk seal was observed several times, photographed and filmed on the Croatian coast (J. Antolović, 2005).

According to the "Declaration on the monk seal risk of extinction in the Mediterranean" which was adopted during the 14th Meeting of the Barcelona Convention Contracting Parties (Slovenia, November 2005) "The species is threatened by many factors, however the major causes of its decline are deliberate killing combined with habitat loss". It also states that "identification of new potential critical habitats and capacity building for effective management are necessary additional steps". This survey was implemented within the framework of the Albania National Action Plan of the SAP-BIO and the recommendations of the above-mentioned Declaration.

In Albania

According to various reports, the Albanian coast does not appear to be frequented by Monachus monachus. Nevertheless, there have been unconfirmed reports of the possible presence of seals in the region of Sazan. It has been suggested that this area, may serve as a kind of bridge between monk seal populations in the countries of the former Yugoslavia and the Ionian Sea (UNEP/MAP, 1994). In the summer of 1999, Albania's Ionian coastline was surveyed for the presence of monk seals, and the habitat was monitored. During the investigation, in the Rreza e Kanalit area, 19 monk seal habitats were surveyed and in one of them traces of monk seal urine were found (Antolović et al. 2005). In summer 2004, a survey was carried out, based on interviews with local fisherman, during which the aim was to gather information on the status of the monk seal and sea turtle populations along the Ionian coastline, from the Greek border to Vlore (Dedei et al. 2005). In the report it was suggested that monk seal habitats exist along the southern Albania coast stretching from Karaburuni and Rreza e Kanalit to the area around Butrint. Fishermen reported two monk seal sightings during the summer of 2004, one in the Rreza e Kanalit-Karaburuni peninsula and the other close to Sarande port.



Data on Dolphin sightings

Most of the fishermen interviewed reported regular encounters with dolphins during their fishing trips. There was little evidence that dolphins caused damage to fishing nets – most damage and loss of catch was attributed to 'Serra' *Lichia ammia*; and fishermen had a mainly respectful attitude towards dolphins.

Status of Sea Turtles

Marine turtles are long-lived slow-maturing reptiles adapted to life in the aquatic environment. Apart from egg-laying, which requires a suitable beach environment, most of their life cycle occurs at sea. Comprehensive studies of the nesting environment have been conducted globally, but marine habitat use remains poorly understood (Lutz and Musick, 1997).

Adult females migrate from a foraging ground to a nesting beach. Mating occurs during the migration, although mating areas are poorly defined. Nesting tends to occur on sandy beaches, when clutches of eggs (average about 100 eggs) are deposited in the sand, usually at night, and left to incubate for about two months. Hatchlings emerge from the egg chamber, perhaps taking 3-7 days to reach the beach surface. Entering the water they swim rapidly offshore (swimming frenzy).

Three sea turtle species are found in the Mediterranean, two of which nest there, and once boasted abundant populations: the loggerhead (Caretta caretta) and the green turtle (Chelonia mydas). The leatherback (Dermochelys coriacea) is an occasional visitor. Mediterranean sea turtles are increasingly threatened by nesting habitat degradation, due to coastal development that is mainly tourist-oriented, and fisheries bycatch. The species, perhaps, most affected by these factors is the green turtle, which is estimated to nest mainly in Turkey, Cyprus and, according to recent reports, in Lebanon. Loggerheads used to nest on many Mediterranean shores, but today only Greece, Turkey, Cyprus and Libya retain sizeable concentrations of nesting females (Venizelos L., 2002). In the Mediterranean region the beaches where nesting occurs are fairly well known. In contrast, the feeding and over-wintering habitats have been proposed mainly from the interaction of turtles with fishing gear (Margaritoulis et al. 2003). However, this approach may suffer profound bias due to the uneven distribution of fishing effort (Casale et al. 2005). A six-year study of marine habitat use by loggerheads in the Ionian Sea has just been completed (White in submission, 2006); this was based on direct observations of turtles at sea. The two options for turtles in winter are to migrate into an area of warmer water, such as the Gulf of Gabès, Tunisia, where active foraging can continue (Groombridge, 1990; Laurent et al. (WWF Project 3937); or to remain in an area of reducing water temperature and face hibernation (or cold-stunning and perhaps death, Witherington and Ehrhart, 1989). Turtles have been reported from Croatia during the winter months (Lazar, 1995; Lazar and Tvrtkovic, 1995 & 1998). A north-bound current passes along the Adriatic's eastern coastline, which could bring post-nesting turtles from Greece into Albanian and Croatian sea areas (Lazar et al. 2000 & 2004).



ANALYSIS

The ecological interest of the site

In the National Park of Karaburun, areas, the most ecologically interesting species of amphibians are found in the wetlands and sweet waters (canals, ponds and swamps); as for reptiles, shrubs, canal catch mends, forests, fields of Juncus sp., olive trees, dunes, etc., represent higher ecological interest.

The level of sensitivity in different habitats used by species of interest

Wetland habitats and sweet waters of the National Park of Karaburun (canals, swamps, pond and rivers) are necessary for the life of all amphibians, because they feed, exchange gases, protect themselves from predators and reproduce in these habitats. The reduction of water or drainage in the above-mentioned habitats will be catastrophically to the amphibians. Thus, drainage of habitats will make the eggs and larvae of all species disappears completely. Water habitats are necessary also for water snakes *and water turtles*.

The forests, scrubs, meadows and the rocks are necessary for the life of some species of amphibians and all the species of reptiles, because they feed, reproduce and protect themselves from predators in these habitats.

The necessity for further studies

It is important to conduct studies and field research in the future. Thus, field trips should be more frequent and evenly distributed throughout the year. More complete data on the bioecology and etiology of most species of amphibians and reptiles can be collected on-field. Specific and detailed studies on globally threatened species, such as the sea *turtles* (*C.coriacea and D.caretta*), sweet water turtles (*E.orbicularis* and *M.caspica*), and for ground turtle (*T.hermanni*) should be conducted. These studies should be followed with the organization of specific workshops and seminars with the local population, especially with the fishermen, school children and youth. For this purpose, which is the education of the local community, posters, leaflets and brochures should be published and distributed. The suggestions above are based on the fact that the local community does not show a high interest towards most of the amphibians and almost all the reptiles; on the contrary, most of these species are considered damaging and even extremely dangerous. There are legends and fairytales told by the local community at National Park of Karaburun. in which one could spot easily the depreciation towards most amphibians and reptiles.



Priority objectives for protection (of species and habitats)

First of all, awareness raising campaigns with the populations of the and National Park of Karaburun areas for the protection of habitats and species of amphibians and reptiles living in them should be conducted. The populations of these areas must be educated with new concepts of the importance that species of amphibians and reptiles play in the nature equilibrium. One must emphasize this, because their concepts concerning these animals are completely wrong and there exists no activity such as habitat protection on the contrary, , they are frequently damaged for ordinary reasons, seriously disturbing the lives of these species.

Management and conservation measures proposed

Management activities

Short term

Keeping the water level under control (ponds, irrigation channels, swamps, etc) should protect the habitats of amphibians.

The habitats of reptiles should be protected through avoiding cutting of shrubs and forests in the areas and by avoiding the fires.

The dunes should be protected from sand removal and cutting of plants that grow on them. Education of fishermen and all the population of the area with the aim to know and protect all species of amphibians and reptiles with emphasis on the rare and globally endangered species.

Medium term

Organize and develop seminars with the population of the National Park of Karaburun areas, prepare and distribute posters, leaflets and publish a brochure on the importance of all species of amphibians and reptiles, the reasons for protecting them, their importance and the necessity for habitat protection. Some of the most important nesting sites for loggerhead turtles in the Mediterranean are on the Ionian coast and the islands of Greece (Margaritoulis *et al.* 2003). In recent reports based on sea turtle strandings and catches in the waters around Italy, it has been suggested that the Ionian / South Adriatic Sea area may be an important developmental oceanic habitat for the turtle population nesting on Greek beaches (Casale *et al.* 2005)

International Conventions for the marine life protection

Several International Conventions contain provisions for the protection of marine turtles. The most important are:

The Convention on International trade in Endangered Species of Wild Fauna and Flora (CITES).

The Convention on Biological Diversity (CBD)

The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention).



The Convention for the Protection of the Mediterranean Sea against pollution (Barcelona Convention).

The Convention on the Conservation of Migratory Species of Wild Animals (CMS) (Bonn Convention).

In 1975 at a meeting of representatives of 16 Mediterranean states in Barcelona the Mediterranean Action Plan (MAP) was created. The Barcelona Convention was adopted a year later. It is the only convention to which all the riparian Mediterranean nations are signatories. Parties to the Barcelona Convention included among their priority targets for the period 1985-1995 the protection of Mediterranean marine turtles and monk seals (Genoa Declaration, September 1985). To this purpose, they adopted in 1989 the Action Plan for the Conservation of Mediterranean Marine Turtles and the Action Plan for the Management of the Mediterranean Monk Seal.

Albania acceded to the Convention on Biological Diversity in 1994 and to the Convention on International trade in Endangered Species of Wild Fauna and Flora (CITES) in 2003; ratified the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (Bonn Convention) in 2001; ratified the Bern Convention in 1999; signed and ratified the UNEP Mediterranean Action Plan (UNEP/MAP) in 1975, the Barcelona Convention and protocols and the revised Action Plans for marine turtles and monk seals in 1999. Within the MAP, recommended actions at National level were listed for each country (UNEP-MAP/ RAC/SPA, Regional Activity Centre for Specially Protected Areas 1999). The recommended actions for Albania mentioned the presence of both monk seals and sea turtles in the seas off the Albanian coast.

Tourism as a Potential Alternative to Fishing?

Fishermen were asked about Tourism as a possible alternative to fishing. It was thought to be a viable alternative by those in Sarande and Shengjin (where some tourism infrastructure was already in place). This could potentially act as an alternative or complement to the fishing industry, as the high tourist season does not correspond with the main fishing season. Some respondents welcomed suggestions of tourism development as they felt that it would increase the market for fish, thus improving prices. They also felt that tourism would provide them with the opportunity to sell fish in the local market, thus cutting out middlemen who bought in bulk (cheaply) for the export market.

Conclusions

To visit Albanian ports is such a difficult procedure and not sustainable. Saranda's port is the only one designed for tourism, but it is so expensive compared to other ports of the region. Our country has immediate need for investments and for protecting all this values; which is evident by the lack of infrastructure. There is some necessary training of the population on sustainable management that require financial support. There are possibilities for marine turtles to grow in the area, and also for a rich biodiversity.



Albanian has faced a lot of economical and financial problems since 1991, and the protection of biodiversity was not considered as something important, that makes all successes in protecting the biodiversity addressed to humans and improving their lives.

Protecting marine environment and its habitant can not be seen as something separate from humans, and their contribution to the environment. The fish men are those in more contact with these animals, so that their opinion should be respected.

There is required an improvement of the collaboration between NGOs, government and volunteers, to better implement national strategies of development, and international convents. This should be implemented all over Albania with the organizations working on the field, to improve the communication between different actors.

Considering the latest studies is evident that:

- It is possible for the western bay of the Karaburun to well come for a short time foks, in order to populate the Dalmat's islands with this kind of animals.
- The Karaburun peninsula has a rich biodiversity and wonderful nature and a rich history.

Recommendations

There is of a big interest, the implementation of long term study program for the big animals, together with a public information process, and also monitoring it. Making some researches to better understand what animal actually live there.

Making some researches to better understand what animal actually liv

Long terms:

Announcing the National Marine park of Karaburun, (as required by the National Action plan and Of Albania and SAP BIO), is necessary to rush the procedures the implementation. Developing and implementation of tourism Sustainable development plans, with the help of international organization, such as World Bank. Planning and developing informational programs, as required by sustainable development criteria, mostly for fish men, and marine population. Strengthen of NGO and governmental organization in introducing researches in marine biology area and education in sustainable development, by collaborating, training and network. All above should be support by the government, by improving the infrastructure, reducing inequality and managing natural resources in a sustainable way.

REFERENCES:

Antolović, Jasna. (1998). Mediterranean monk seal (*Monachus monachus*) habitat in Vis Archipelago, the Adriatic Sea. Monachus Science. The Monachus Guardian, Vol.1 No.2, December 1998.

Antolović, J., (2005). Mediterranean News. The Monachus Guardian. Vol. 8 (2), December 2005

Casale P., Freggi D., Basso R. & Argano R., (2005). Oceanic Habitats for Loggerhead Turtles in the Mediterranean Sea. Marine Turtle Newsletter 107:10-11



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

Dedei Z., Bego F., Marika K., Kapedani R. (2005), Unpublished report for an IFAW project.

Haxhiu, I. & Uruci, S. (1998). Some data on marine turtles in Albania. UNEP(OCA) /MED WG.145/4 Annex IV:1-5.



DEPENDENCE OF GRAIN QUALITY ON FERTILIZATION, CROP ROTATION, AND TILLAGE

Nadejda TODODROVA, Svetla BACHVAROVA, Dafina NIKOLOVA, Staika STRATIEVA

N. Poushkarov Institute of Soil Science, 7, Shosse Bankja, Sofia ttlidia@yahoo.com

The influence of mineral fertilization, use of intermediate crops and tilage on the quality and quantity of grain is investigated in the following cases: wheet from Sadovo-1, barley from Obzor, grown on leached Smolnize in the regions of Sofia and lambol. It is established the the balanced mineral fertilization influences positively the quality and quantity of wheet and barley. Metheorological condition of the year influence the quality of the physical properties. In cases of absense of fertilization the mass difference for 1000 grains for favorable or unfavorable year varies from 8 to 10 gramms. In case of fertilization, higher mass values are oserved compared to the control for the whole period of three years of investigation. It is establishes that the influence of Nitrogen, Phosphorus or Potassium on the mass parameter is not one-directed. The balanced mineral fertilization increases the value of grain due to mineral fertilization is observed. For the soils investigated, the technological and physicochemical grain qualities are not essencially influenced by use of intermediate crops or by tilage.

Introduction

At cultivation of cereals it is very significant as the yield of grains as well their quality. The formation of yield and quality of grin to a big extend depends on the choice of suitable sorts and technologies, that are optimal for the respective soil and climatic conditions.

Material and Methods

With this study was determined the influence of mineral fertilization, previous crop in rotation, mode of soil tillage (loosen with depth increasing device KRN-2.4 (Bulgarian made), $10 - 12 \text{ cm} - \text{variant B}_1$), direct sowing (variant B₂), and compacted crop rotation with previous winter crops on the grain quality. In the publication are discussed the data of three years period from two multi-factorial field experiments with wheat, sort Sadovo-1, on Leached Smolnitsa (Haplic Vertisol, FAO, 1992), From Sofia district. In addition are discussed results of multi-factorial field experiment with barley, sort Obsor, at soil tillage C, and norms of fertilization – T, which was conducted on Leached Smolnitsa from Iambol district, Bulgaria.



Results and discussion

Use of mineral fertilization in wheat cultivation, influence not only the yield size, but also the grain quality (Table 1). With the increase of fertilization norm, the content of proteins slightly increase (it is 13.0 % at $N_0P_0K_0$, and 13.6 % at $N_{60}P_{60}K_{60}$). A similar tendency is observed with the content of gluten. In the Variant with $N_{60}P_{60}K_{60}$ the content of gluten reaches 35.5 %, while in the control it is 30 %. Mineral fertilization influences the bred volume. The highest volume was received at $N_{60}P_{60}K_{60}$, and that was 541 cm³. The energy of wheat flour from fertilized variants increase significantly in comparison with that of the control, which was 158.2 erg, and reached the highest value in the variant with $N_{60}P_{60}K_{60}$, where it is 349.3 erg.

Table1.

| Variant | Yield | Protein | Wet | Flour | Bread | Hyaline |
|------------------------------------|---------|---------|--------|--------|----------|---------|
| Norms of | (кg/ha) | S | gluten | energy | volume | (%) |
| fertilizati | | (%) | (%) | (erg) | (cm^3) | |
| on | | | | | | |
| (кg/ha) | | | | | | |
| $N_{\theta} P_{\theta} K_{\theta}$ | 4205.0 | 13.0 | 30.0 | 158.2 | 475 | 81 |
| N_{60} P_{60} | 4802.0 | 13.6 | 35.5 | 349.3 | 541 | 85 |
| K ₆₀ | | | | | | |
| N ₁₂₀ P ₆₀ | 5100.0 | 13.1 | 33.8 | 288.5 | 477 | 83 |
| K ₆₀ | | | | | | |

Yield and quality indexes of wheat grain.

The quality composition of the grains and the absolute composition of protein fractions change significantly, depending on the phases of ripeness, (Table 2).

Table 2.

Total amount of protein fractions depending on the ripeness stage.

| Stages | Variant | Nitrogen content (g/1000, lants) | | | | | | |
|-------------------|--|-------------------------------------|----------|---------|--------|--------|--|--|
| | | Total | Albumen | Gliadin | Gluten | Others | | |
| | | | + | | | | | |
| | | | Globulin | | | | | |
| Milky ripeness | $N_0 P_0 K_0$ | 11.2 | 2.7 | 2.2 | 2.6 | 3.7 | | |
| | $N_0 P_0 K_0$ | 29.8 | 7.4 | 6.6 | 8.3 | 7.5 | | |
| Full | | | | | | | | |
| ripeness | N ₆₀ K ₆₀ | 37.1 | 4.8 | 10.6 | 10.8 | 10.9 | | |
| | P ₆₀ K ₆₀ | 35.8 | 8.5 | 10.0 | 10.4 | 6.9 | | |
| | N ₆₀ P ₆₀ K ₆₀ | 38.5 | 9.8 | 12.0 | 11.1 | 5.6 | | |
| | N ₁₂₀ P ₆₀ K ₆₀ | 33.7 | 8.1 | 10.9 | 9.1 | 5.6 | | |



The content of total Nitrogen in the grains significantly increased in the process of ripening. In the control variant, at milky ripeness, the grains of 1000 plants, contained 11.2 g Nitrogen, but in the phase of full ripeness its content reached up to 29.8 g. In the variant fertilized only with $N_{60}K_{60}$, the content of Nitrogen in the albumin + globulin is less as compared to the variant with full mineral fertilization of $N_{60}P_{60}K_{60}$. Further increasing of the Nitrogen norm – $N_{120}P_{60}K_{60}$, in all fractions decrease the Nitrogen content.

Table 3.

Table 4.

Content of protein (%), and Total Phosphorous (P_2O_5 %), depending on stages of ripeness of wheat grains at different fertilization.

| Variant | Proteins (%) | | | Т | $Cotal P_2 O_5 (\%)$ |) |
|---|--------------|----------|----------|----------|----------------------|----------|
| | Milky | Wax | Full | Milky | Wax | Full |
| | ripeness | ripeness | ripeness | ripeness | ripeness | ripeness |
| $N_0 P_0 K_0$ | 14.2 | 13.2 | 13.0 | 0.76 | 0.65 | 0.86 |
| N ₆₀ P ₆₀ | 11.7 | 12.8 | 12.0 | 0.78 | 0.72 | 0.80 |
| N ₆₀ K ₆₀ | 12.0 | 13.1 | 14.4 | 0.65 | 0.67 | 0.84 |
| P ₆₀ K ₆₀ | 9.5 | 9.7 | 12.5 | 0.67 | 0.65 | 0.93 |
| N ₆₀ P ₆₀ K ₆₀ | 13.5 | 12.7 | 13.6 | 0.66 | 0.72 | 0.95 |
| $N_{120} P_{60} K_{60}$ | 14.2 | 12.5 | 13.1 | 1.05 | 0.82 | 0.98 |
| $N_{60} \ P_{80} \ K_{60}$ | 13.8 | 12.5 | 12.2 | 1.15 | 0.80 | 0.95 |

The contents of protein (%) and Total Phosphorous – (P_2O_5 in %), by the phases of wheat grain ripeness, depending on the mineral fertilization, are represented in Table 3. By the phases of ripeness, is changed also the content of phosphorous in the grain, as the character of change depends mainly on mineral fertilization. This study showed that a certain influence (together with the mineral fertilization) plays also the previous crop in the rotation (Table 4).

| Infl | uence | of | previous | rotation | crop | o n | the | grain d | quality |
|------|-------|----|----------|----------|------|-----|-----|---------|---------|

| injtachee oj | previous i | oration en | op on me | Statt quat | uy. | | |
|--|------------------|-----------------|----------------------|--------------------------|---------------------------------------|----------------------------------|----------------|
| Variant | Yield (kg/ha) | Proteins (%) | Wet gluten (%) | Flour energy (erg) | Bread volume (cm ³) | Baking properties (rating) | Hyaline (%) |
| Peas | | | | | | | |
| N ₀ P ₀ K ₀ | 4200.0 | 15.5 | 32.2 | 354.2 | 562 | 4.5 | 81 |
| $N_{80}P_{80}K_{80}$ | 5121.0 | 17.0 | 32.6 | 340.1 | 603 | 4.4 | 80 |
| Maize | | | | | | | |
| $N_0 P_0 K_0$ | 4162.0 | 16.3 | 34.5 | 255.1 | 600 | 4.4 | 92 |
| $N_{80}P_{80}K_{80}$ | 5000.0 | 16.8 | 34.8 | 336.9 | 720 | 4.4 | 95 |



When the previous crop is peas, the indexes of wheat grain quality, especially the content of protein, is changed more significantly due to the mineral fertilization, in comparison with the case, when the previous crop is maize. The bread-baking properties of the wheat flour showed that the norms and ratios of mineral fertilization influence insignificantly total bred weight. Volume of bred is highest at fertilizations $N_{60}K_{40}$ and $P_{40}K_{40}$ being 520 cm³ [3]. The mass of 1000 wheat grains is influenced mainly by the climatic condition in the year, and less by the compaction of crop rotation with previous winter crops, type of the previous crop and system of tillage (Table 5).

Table 5.

| Variant | Mass of 1000 grains | | | Hectoli | ter mass | | Hyaline (ml) | | | | |
|---------------------|-----------------------|--------|----------------|---------|----------|------------|--------------|-------|------------|------|--|
| XX7 at a s | TT'11 | (g) | | | (kg) | | | (111) | | | |
| winter | Thage | | | | | | | | | | |
| rotation | | | | | | | | | | | |
| crop | | | | | | | | | | | |
| Number of Y | lears | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | |
| Peas B | 1 | 49.9 | 44.4 | 42.7 | 80.2 | 74.2 | 78.5 | 51.0 | 54.0 | 74.5 | |
| B | B ₂ | 50.0 | 43.9 | 46.0 | 80.4 | 74.0 | 78.2 | 53.0 | 49.0 | 75.5 | |
| Cole B | 1 | 50.2 | 46.3 | 43.2 | 80.0 | 74.2 | 78.0 | 56.5 | 45.5 | 74.0 | |
| В | \mathbf{B}_2 | 49.2 | 44.7 | 43.9 | 80.1 | 74.3 | 78.0 | 51.5 | 55.5 | 75.5 | |
| Repco E | B ₁ | 49.8 | 45.1 | 40.4 | 80.4 | 74.2 | 76.9 | 52.0 | 48.0 | 72.5 | |
| В | B ₂ | 50.6 | 43.9 | 41.8 | 80.1 | 74.0 | 77.8 | 55.0 | 54.0 | 75.5 | |
| Triticale E | B ₁ | 49.6 | 45.0 | 44.2 | 80.0 | 73.8 | 77.6 | 52.5 | 52.0 | 74.5 | |
| I | B ₂ | 48.6 | 42.4 | 41.8 | 80.0 | 73.1 | 77.6 | 51.5 | 49.0 | 73.5 | |
| Triticale + H | \mathbf{B}_1 | 49.2 | 44.2 | 42.8 | 80.2 | 74.0 | 77.9 | 49.5 | 42.5 | 69.5 | |
| Peas 1 | B_2 | 49.2 | 42.6 | 41.5 | 80.0 | 74.5 | 77.2 | 57.0 | 47.5 | 76.0 | |
| Without com | npaction | 49.2 | 45.8 | 45.7 | 80.6 | 74.3 | 78.2 | 50.0 | 51.0 | 76.0 | |
| Mean | | 49.6 | 44.4 | 43.1 | 80.1 | 74.1 | 77.8 | 52.7 | 498 | 74.3 | |
| Variant | | | | | | | | | | | |
| | | | | | | | | | | | |
| Winter | Tillage | Sedime | Sediment value | | | Vet gluten | | | Dry gluten | | |
| previous | | (%) | | | (%) | | | (%) | | | |
| rotation | | | | | | | | | | | |
| crop | | | | | | | | | | | |
| Number of Y | lears | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | |
| Peas B_1 | | 41 | 45 | 41 | 38.9 | 33.8 | 43.1 | 15.0 | 9.9 | 16.8 | |
| B | 2 | 42 | 44 | 47 | 37.6 | 32.6 | 45.1 | 15.8 | 9.9 | 14.9 | |
| Cole B ₁ | 1 | 40 | 43 | 45 | 40.3 | 30.0 | 41.7 | 16.2 | 11.0 | 14.9 | |
| B | 2 | 41 | 43 | 44 | 37.7 | 31.2 | 42.4 | 15.2 | 12.1 | 14.7 | |
| Repco B | 1 | 39 | 44 | 43 | 38.4 | 29.6 | 45.4 | 15.5 | 10.8 | 15.4 | |
| B | 2 | 36 | 44 | 43 | 39.0 | 35.5 | 45.9 | 15.7 | 12.8 | 16.7 | |
| Triticale B | 1 | 36 | 46 | 41 | 37.9 | 33.9 | 43.8 | 15.3 | 12.6 | 15.8 | |
| | 5 2 | 39 | 45 | 47 | 57.4 | 33.4 | 42.9 | 14.4 | 12.3 | 15.5 | |
| 1riticale + H | 5 ₁ | 39 | 45 | 41 | 51.9 | 32.3 | 45.8 | 15.2 | 11.5 | 14.7 | |
| Peas E | s ₂ | 40 | 45 | 40 | 57.8 | 32.7 | 45.4 | 14.5 | 11.8 | 14.6 | |
| Without com | npaction | 39 | 37 | 35 | 40.3 | 27.8 | 45.8 | 14.6 | 10.8 | 14.1 | |

Physical and technological properties of the wheat grains.



Table 5. Cont.

| Mean | 39 | 44 | 42 | 38.5 | 32.1 | 44.1 | 15.2 | 11.4 | 15.3 |
|--------------------------|-----------|-----------|----|----------|------|------|------------|------|------|
| Variant | | | | | | | | | |
| Winter Tillers | C a diana | | | Wet also | -4 | | Deve | 4 | |
| winter Tillage | Sedime | ent value | | wet git | iten | | Dry gluten | | |
| rotation | (%) | | | (%) | | | (%) | | |
| crop | | | | | | | | | |
| Number of Years | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| Peas B_1 | 41 | 45 | 41 | 38.9 | 33.8 | 43.1 | 15.0 | 9.9 | 16.8 |
| B_2 | 42 | 44 | 47 | 37.6 | 32.6 | 45.1 | 15.8 | 9.9 | 14.9 |
| Cole B ₁ | 40 | 43 | 45 | 40.3 | 30.0 | 41.7 | 16.2 | 11.0 | 14.9 |
| B_2 | 41 | 43 | 44 | 37.7 | 31.2 | 42.4 | 15.2 | 12.1 | 14.7 |
| Repco B ₁ | 39 | 44 | 43 | 38.4 | 29.6 | 45.4 | 15.5 | 10.8 | 15.4 |
| B ₂ | 36 | 44 | 43 | 39.0 | 35.5 | 45.9 | 15.7 | 12.8 | 16.7 |
| Triticale B ₁ | 36 | 46 | 41 | 37.9 | 33.9 | 43.8 | 15.3 | 12.6 | 15.8 |
| B ₂ | 39 | 45 | 47 | 37.4 | 33.4 | 42.9 | 14.4 | 12.3 | 15.5 |
| Triticale + B_1 | 39 | 45 | 41 | 37.9 | 32.3 | 43.8 | 15.2 | 11.5 | 14.7 |
| Peas B ₂ | 40 | 45 | 40 | 37.8 | 32.7 | 45.4 | 14.5 | 11.8 | 14.6 |
| Without compaction | 39 | 37 | 35 | 40.3 | 27.8 | 45.8 | 14.6 | 10.8 | 14.1 |
| Mean | 39 | 44 | 42 | 38.5 | 32.1 | 44.1 | 15.2 | 11.4 | 15.3 |

The values are highest in the year with the best distribution of precipitation during the vegetation period, being 48.6 g to 50.0 g for 1000 wheat grains. The character of meteorological conditions influence stronger grain hyaline, in the parameters 42.5 % to 76 %, amount of dry and wet gluten, water-holding ability of flour, and stability of dough [1, 2]. From the studied technological properties of the grain the sediment value, which gives indirect evaluation of bred-baking strength of flour, varies from 37.0 % to 44.3 %, this means medium values of good bred-baking properties, that is not influenced significantly by the type of the year. Similar is the tendency about the indexes extendibility, degree of softening, bred volume, brittleness, elasticity, and bred crust color. The total rating of the bred-baking properties of wheat flour shows higher values when wheat is cultivated after peas or repko in the rotation. The ratings in this cases being 5.0 to 5.2.



Table 6.Yield and physical properties of barley grains.

| Variants | | Without | Compacted | Not cong | gested | Congested | |
|----------------------------|-------------------------------|------------|------------|----------|------------|-----------|------------|
| Tillage | Fertilization | compaction | Mean yield | Dry | Mass of | Dry | Mass of |
| | (kg/ha) | Mean | (kg/ha) | Mass | hectoliter | Mass | hectoliter |
| | | yield | | of 1000 | in | of 1000 | in |
| | | (kg/ha) | | grains | (kg) | grains | (kg) |
| | | | | (g) | | (g) | |
| C_1 – harrowing | $T_1 - N_{90}P_{75}K_{60}$ | 5130 | 4720 | 51.3 | 66.06 | 49.8 | 65.34 |
| at a depth 8-10 | $T_2 - N_{120}P_{100}K_{80}$ | 5330 | 5090 | 50.6 | 65.67 | 50.2 | 65.79 |
| cm and 6-8 cm | $T_3 - N_{150}P_{125}K_{100}$ | 5590 | 5600 | 51.1 | 65.22 | 49.1 | 64.93 |
| C ₂ – loosen at | $T_1 - N_{90}P_{75}K_{60}$ | 4740 | 3520 | 50.7 | 66.39 | 51.6 | 66.27 |
| depth 8-10 cm | $T_2 - N_{120}P_{100}K_{80}$ | 5400 | 4420 | 51.4 | 65.90 | 51.2 | 66.11 |
| and 6-8 cm | $T_3 - N_{150}P_{125}K_{100}$ | 5510 | 4690 | 51.1 | 65.69 | 50.4 | 65.89 |
| C_3 – adapted | $T_1 - N_{90}P_{75}K_{60}$ | 4640 | 4700 | 51.4 | 66.00 | 50.4 | 66.01 |
| (direct) sowing | $T_2 - N_{120}P_{100}K_{80}$ | 5430 | 4960 | 50.6 | 65.68 | 49.7 | 64.98 |
| | $T_3 - N_{150}P_{125}K_{100}$ | 6150 | 5050 | 50.6 | 65.16 | 50.1 | 65.12 |
| C ₄ – combined | $T_1 - N_{90}P_{75}K_{60}$ | 5000 | 4380 | 51.5 | 65.97 | 51.2 | 66.65 |
| cultivation with | $T_2 - N_{120}P_{100}K_{80}$ | 5250 | 4910 | 51.2 | 65.62 | 51.3 | 66.35 |
| use of KRN, | $T_3 - N_{150}P_{125}K_{100}$ | 5290 | 5630 | 51.8 | 65.84 | 49.6 | 64.89 |
| 2.4 at a depth | | | | | | | |
| of 10-12 cm | | | | | | | |
| C_5 – ploughed | $T_1 - N_{90}P_{75}K_{60}$ | 4870 | 4640 | 52.0 | 66.44 | 51.2 | 66.31 |
| to depth of 10- | $T_2 - N_{120}P_{100}K_{80}$ | 5820 | 4950 | 51.2 | 65.11 | 50.2 | 65.06 |
| 12 cm, and | $T_3 - N_{150}P_{125}K_{100}$ | 6220 | 5440 | 50.0 | 65.81 | 49.9 | 65.10 |
| harrowing at | | | | | | | |
| 6-8 cm | | | | | | | |

The data from the experiment with barley showed that the highest yield of 6220 kg/ha barleycorn in non compacted crop rotation was received at variant C_5T_3 - plowing at depth of 10 to 12 cm, harrowing on 6 to 8 cm, and fertilization $N_{150}P_{125}K_{100}$, but at compacted to 50 % crop rotation the highest yield is received at C_4T_3 loosen with depth increasing device KRN - 2.4 (Bulgarian made) to a depth of 10 to 12 cm, harrowing on 6 to 8 cm, and fertilization $N_{150}P_{125}K_{100}$, the yield at that being 5630 kg/ha (Table 6). Fertilization influence technological properties of brew barley in two aspects- the brew value of barley is improved through the physical properties of the barleycorn-namely the hectoliter mass and the mass of the absolute dry 1000 grains, and of its malt value. Soil tillage influences insignificantly those indexes. The higher hectoliter and absolute barleycorn masses were received from the join effect of soil tillage and fertilization in variant C_5T_1 at non compacted crop rotation, but at compacted to 50 % crop rotation the most favorable were the conditions for the absolute mass in the variant C_2T_1 , and for the hectoliter mass, they were most favorable in variant C_5T_1 .



Conclusions

Mineral fertilization influences quantity and quality of the wheat grain. Some effect on the quality of wheat grain, together with mineral fertilization, exerts previous crop in the rotation. This study showed the comparatively limited possibilities to increase the amount of protein in the wheat grain trough mineral fertilization. The technological, physical and bred- baking qualities of wheat are not influenced significantly by the compaction in the rotation with winter crops and by the used tillage system. In the case of brew barley, fertilization also influences more significantly the grain quality, as compared to the soil tillage and the compaction of crop rotation with some catch-crops.

REFERENCES:

- 1. Nikolova D., et al. (1996) Dependence of wheat grain quality on compaction of crop rotation with winter crops and on the soil tillage system. Plant Sciences, N 8, pp. 5-8, Sofia, (In Bulgarian).
- 2. Stratieva St., et al. (2004) Influence of different soil tillage systems, and fertilization on the content of the main nutrients in the soil at barley cultivation in non compacted crop rotation. Proceeding of conference with international participation, pp. 221-227, Iambol, Bulgaria (In Bulgarian).
- 3. Todorova N., et al. (2001) Influence of mineral fertilization on grain quality of winter soft wheat. Soil Science, agro-chemistry, and Ecology, v. XXXVI, N 2-3, Sofia (in Bulgarian).



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



HOW CAN WE COPE ENVIRONMENTAL SUSTAINABILITY WITH TOURISM-BASED ECONOMIC DEVELOPMENT ? BEACH NOURISHMENT PROJECTS AS A WAY TO REHABILITATE OUR COASTS AND CONTRIBUTION TO TOURISM

Ozlem UNAL¹ & Kemal BIRDIR ²

¹ Eureka Business Ventures Srl. Strada di Passo Carini 10/C 05022 Amelia (TR) Italy ² School of Tourism and Hotel Management, Tece Campus, Mersin, Turkey. unalozlem68@yahoo.com, kemalbirdir@mersin.edu.tr

Mersin has been faced serious urban development problems since 1950s especially along the coast, development of second homes and other type of structures being the main reasons. Through years, with construction works, coastal geology has been changed and former beach along the coast was lost. During 1990s several initiatives were taken in order to provide recreational possibilities along the coast an a project was realised by the local government. Today coastal belt of Mersin has an recreational area where once there was a beach. In this study an experimental beach execution project was considered along the Mersin coast where above-mentioned recreation area ends and coastline starts.

A possible beach nourishment project along the Pozcu coast, Mersin will have potential short and long-term physical-ecological, socio-cultural and economic impacts. Increased business revenues through improved beach facilities, increased tax revenues, enhanced property values, increased property tax values and local job creation will be likely positive economic impacts of the nourishment. Although environmental impacts are also difficult to measure methods like Contingent Valuation and Travel-cost methods can be utilised to value possible environmental impacts.. Finally study results show that, a beach nourishment project that can be applied to a central development part of Mersin coast costs appr. 11.330.000 Euro for a 9 kilometer long beach with a width of 100 meters. This figure is appr. 6.113.000 Euro for a 4 km. long beach.

Introduction

Development of tourism and conservation of the environmental and socio-cultural assets have been the two main goals of the second part of the 20th century. Following the last 20 decades' developments in science and technology and the need for economically, socio-culturally and environmentally balanced development, policies and strategies aiming to conserve and protect ecosystems, to enrich socio-cultural values as well as providing economic contribution employ integrated planning and management approaches to reach desired results.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

According to the World Tourism Organisation's figures related to the year 2005 [1], international arrivals reached to 808 million with a 5.6% increase as compared to the year 2004. Europe attracted more than half of the arrivals (441,6 million), Southern / Mediterranean Europe having the highest percentage (35.8%). International tourism receipts however reached to US\$682 billion (Euro 548 billion) with a 4.2% increase as compared to the year 2004. Forecasts show that international arrivals are expected to reach over 1.56 billion by 2020 and of these worldwide arrivals, Europe will attract 717 million tourists followed by East Asia and Pacific and Americas. Europe will maintain the highest share of world arrivals although a decline is expected from 60% in 1995 to 46% in 2020 [2].

Despite its positive impacts over the destinations, world-wide tourism has a series of negative impacts if not planned, realised and managed considering the physical–environmental, sociocultural and economic values of the destinations. Beaches, being one of the most attractive, valuable and at the same time highly vulnerable natural assets of the Mediterranean countries, deserve particular attention. Besides being main tourist attractions, they are the basic supports of local and national economies. Therefore they have an economic value. However they have an ecological value by acting as defence mechanisms protecting the coast from damages of the sea and prevent erosion as well as providing rich environment for flora and fauna.

Coastal Erosion: Reasons, Results and Coastal Erosion Management

Beaches have always been threatened by moving dynamics and human activities. Beach erosion, which has been a natural phenomena throughout the history, is today turned into problem of growing intensity due mainly to human influence. [3]. In many coastal areas of the world in general, and in the Mediterranean basin in particular, erosion problem is increased by human activities through vegetation clearings, industrial and tourism developments, construction of hard coastal defence structures, land reclamations, river basin regulation works, sand mining and dredging activities, gas mining and water extraction as well as by natural factors such as the effects of waves, tides, near-shore currents, storms and sea-level rise. Those factors caused a gradual disappearance of dynamic ecosystems and their coastal landscapes.

In the Parliamentary Assembly of the Council of Europe [4] it was stated that :

"Among European coastlines and their hinterlands, those of the Mediterranean region are home to a unique natural and cultural heritage, apart from being highly coveted areas for human habitats and activities. Current demographic trends and development patterns in the Mediterranean Region do, however, present a clear threat to the delicate and already disturbed balance between humans and their environment. The Mediterranean coastline needs to be better protected from multiple and mounting pressures that result from industrial, urban and other human-induced development of coastal areas in general and from poorly planned mass tourism development in particular". Furthermore: "Coastal erosion, which affects about half of the Mediterranean shoreline, is only part of this bigger challenge and is in part a natural occurrence that can never be completely controlled. It is also a problem affecting other coastal regions in Europe. Coastal erosion can and must be managed in a manner that better reconciled economic development and environmental protection..."



The scale of the erosion problem in European coastal states is worthy of attention. About 20.000 kilometers of coasts (20% of all European coasts) faced serious impacts in 2004. The area lost or seriously impacted by the erosion was estimated as 15 km² per year [3]. Furthermore, the results of the EUROSION Study, commissioned by the Directorate-General for the Environment shows that 12% of the total of 100,925 km of the inventoried coastal length in the Mediterranean basin is eroding and unprotected; 3% is eroding despite protective measures and 14% is accreting [3]. Furthermore along the European coastal stretches examined, 40,7% (41065 km.) is composed of beaches and 8996 kilometer of it is being eroded, 2318 kilometer is being protected but still eroding and 5130 kilometer is protected [5].

In order to deal with the problem of coastal erosion three broad management techniques are employed all over the world:

- 1. Using hard engineering structures such as construction of groins, breakwaters, sea walls in order to limit the continuing damage,
- 2. utilizing soft engineering techniques such as using merged or submerged sand-sac barriers or initiating a beach nourishment program (sometimes coupled with hard measures to reach desired level of protection),
- 3. abandoning or moving building and other facilities from the affected environment to prevent further damage.

It has to be stated here that, beach nourishment programs as a soft engineering technique is more favourable since 1980's due to their environmental-friendly solutions.

Beach Nourishment as a way to Rehabilitate Coastal Areas and their Contribution to Tourism

Importance of the beaches for many coastal destinations and the need to protect such finite assets have been focused by many researchers [6-7-8-9]. Coastal erosion and the impacts on tourism [10-11], execution of beach nourishment projects and technological developments [12-13-14-15-16-17-18-19-20] have also been an area of research by many. Beach nourishment through utilizing offshore sand deposits [21-22-23-24], effects of sand extraction on the flora and fauna [25-26-27-28-29], erosion and beach nourishment monitoring [30-31-32] have been other areas of concern.

Financial dimension of beach nourishment projects has also been investigated and the studies range from analysing the cost of beach nourishment projects, estimation of the value of beach recreation after nourishment to the cost of maintaining the beaches and the arrangements for financing beach nourishment projects [7-22-33-34-35-36-37-38].

Beach nourishment is a soft-engineering method applied through providing necessary sediment to a coastal area in order to prevent coastal erosion and create / increase recreational possibilities. The definition itself involves restoration and periodic nourishment.



Factors promoting the beach nourishment projects can be cited as ever-increasing coastal populations, increasing pressure for beach-dependent recreational opportunities and facilities, increasing public awareness towards coastal hazards such as erosion, storm damage etc, decreasing popularity of using hard engineering structures [39], sediment deficiencies and contributions of beach-dependent tourism to the economy [7]. Furthermore, Benefits of beach nourishment projects are: reducing erosion and flood damage, resetting long-term erosion clock, enhancing recreation and tourism possibilities, dispelling the negative erosion-prone stigma of the community involved, increase awareness towards sand as a vital coastal resource [39].

In Northern Europe, beach nourishment has become practice since about 17 years and examples from Spain, Portugal and Italy during the last decades are noteworthy. Being a flexible option as compared to 'solid' engineering techniques, beach nourishment fits more into the natural dynamic character of sandy coasts [16].

Erosion along the Turkish Coasts

Although the levels of coastal erosion in the Mediterranean basin are remarkably high around the deltaic areas like the deltas of the Nile and Po Rivers and Albanian Rivers, it has been also an important issue along the densely populated tourist destinations of the Italian, Spanish and French coasts [40]. The situation is equally important along the Turkish coasts although the level of erosion is relatively lower in terms of the loss of quantity of the beach material per year.

Between 1953 - 1993 the level of coastal erosion along the Anamur coast (Antalya) has been between 5 to 47 meters and since 1993, an additional 5 to 34 meters of loss observed; along the Kazanli coast (Mersin), the level of erosion faced between 1959 - 1993 has been 34 - 60meters and since 1993, an additional of 3-6 meters of erosion was observed. Within 20 year period which covers 1973 - 1993 years, the level of erosion has been 15 to 136 meters and since 1993, this figure has increased an extra of 3 -14 meters. Along the Finike and Kumluca coastal part of Antalya, observed change in erosion level has been between 20 - 220meters...[41]. Active shoreline changes have also been observed along the Seyhan, Ceyhan and Goksu deltas as well. Between 1954 - 1995, a total of 1,012,536 m² area has been lost due to coastal erosion along the delta of the Seyhan River mainly due to the construction of a dam in 1954. On the mouth of the Ceyhan River, on the other hand, between 1947 - 1995, total loss due to erosion has been 3,097,745 m², once more dam construction being the reason. Finally along the delta of Goksu between 1956 - 1995, total loss has been 398,445 m². To the southwest, along the Cape Incekum, total amount of erosion was calculated as 200,125 m² [42].



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

Dam construction, san and gravel mining along the river bed, illegal san mining from the beach, construction of structures along the coast and erosion control in the watershed have been stated as the accelerating effects of coastal erosion in the vicinity of the Madra Creek, northern Aegean coast of Turkey [40]. Beside the Mediterranean and the Aegean coast, Black Sea coast of Turkey has also been exposed to severe coastal erosion since last 30 years mainly due to man-made activities like sand mining for construction purposes and construction of a highway along the shore and inadequate site selection of harbours [43].

Despite the laws and enactments aiming to prevent undesired developments along the coastal areas and presence of environmental conservation and protection measures, Turkish coasts face severe problems of urbanisation, over-use of natural assets, problems of infrastructure and erosion. Although measures to prevent such problems are widely known and planning initiatives at regional and local scales are carried out accordingly, in some cases wrong planning decisions and insufficient knowledge of the local government bodies about the importance of the problems create further undesired and long-term results. Therefore, there is a severe need to understand and introduce widely the reasons of the problems faced along the coastal areas, the ways to prevent and lessen those impacts through internationally well-known coastal zone management techniques and know-how.

Development of Tourism and Factors Causing the Coastal Erosion in Mersin

Development of tourism in Mersin

Located along the Eastern Turkish Mediterranean, Mersin is one of the important port towns of Turkey. With its 326 km of unique shores, it is also one of the most promising tourism destinations not only for Turkey but also for the Mediterranean basin. Historical remains of Mersin are probably some of the best, diverse and most interesting in the world. One can find most fascinating artistic and cultural remains of Romans, Christians and Muslims in the region.

However, many factors caused development of tourism in Mersin to be slow or not to be an acceptable level [44]. Lack of tourism promotions for Mersin, lack of support at the political level for the development of tourism, lack of coordination between private and public organizations and lack of leadership to develop tourism, scarcity of resources dedicated to development of tourism, lack of control of municipalities in conserving the environment, particularly the sea and the beaches can be stated as the main reasons which are responsible to this conclusion [45].

Despite being home of some incomparable resources, to develop a successful tourism industry in the region, Mersin's tourism industry was an interestingly mediocre one. For example, according to Mersin Tourism Promotion Office, in 2006, total number of hotel rooms with tourism operation certificate was only 2,584 (See Table 1).





Table 1: Hotel room numbers with tourism operation certificate in Mersin (2002 – 2006) [46]

Total number of hotel beds in relation to above room numbers was only 5,774. As compared to Antalya, Mersin's neighbour city with its 325 km long shores and highly developed tourism industry, total number of hotel beds in 2006 was 250,000 and was hosting almost 8 million international tourists in 2006 [47]. Moreover, thousands of domestic tourists especially from neighbourhood cities insist to visit Mersin despite highly polluted and mostly diminished beaches. Actions to recover the lost shores and to increase room numbers with high quality tourism services in the city will probably help to solve many of the city's major problems including high unemployment rates as well as providing better recreational possibilities both for domestic and foreign visitors.

Factors causing coastal erosion in Mersin

With its favourable warm climate and suitable life conditions such as comparably low food and housing prices. Mersin's population experienced a very rapid growth during the last two decades [48]. "This growth rate is above population growth rate of Turkey. In this respect, Mersin has become a migration center" [49]. Rapid immigration has been the major problem causing many social and environmental problems in Mersin [50]. Especially State Shore Law that passed in 1985 had many pitfalls including wrong construction regulations on coastal zones. Municipalities gained an uncontrolled power to design and manage development plans. Combined with low land prices due to economic crisis experienced in Turkey since mid 80s, almost 90 percent of Mersin city is located on and nearby Mediterranean coastal line. Rapidly polluting the sea, major land reclamations on city shores were experienced. Municipalities that were not able control and manage the rapid growth of the city were also important reasons for coastal erosion in Mersin. Mostly inexperienced in developmental plans, municipalities as political actors were easily manipulated by local forces and abused in terms of river basins' usage and management, development of constructions along the coast and on the beaches. Not only in Mersin but almost in all coastal destinations of Turkey, it is not a surprise to see hotels, holiday villages, second homes and similar constructions that were built right onto the beaches. The end product of these factors is a city with almost no beaches for tourism development and recreational activities.



An Experimental Beach Nourishment Project along the Pozcu Coast, Mersin

Laws and regulations related to the execution of a beach nourishment project in Turkey

Although there are not specific regulations related to the execution of beach nourishment projects in Turkey due to that the method is not well-known and not applied up to now, articles of the Law for the Environment and related Environmental Impact Assessment (E.I.A.) enactment and articles of Mining Law provide some regulatory framework. It is stated in "Enactment for the Environmental Impact Assessment" [51] (after the following amendments in 1993, 1997, 2002) of the Environmental Law [52] that:

g) projects that will be executed for the purpose of gaining land area of 10.000 m^2 and over from the sea,

h) works that will be executed along the coast for the purpose of combating with the erosion and works that may cause a change in the coast; breakwaters, groins, sea walls etc. (except the maintenance of those mentioned),

r) dredging projects are subject to the "Application of the Selection and Election Criteria" which depends on the ministerial decision of either "EIA is necessary due to that environmental impacts of the project are important and so subject to the preparation of the EIA Report" or "EIA is unnecessary due to that there are no important environmental impacts and so there is no necessity for the preparation of the EIA Report".

Assuming that the sand necessary for the execution of a beach nourishment will be provided from the marine borrow area(s) which needs dredging and, the project will change the nature of the coastal area through providing an extra surface along the coast, then beach nourishment will be subject to above-mentioned procedures of the enactment of the EIA.

Secondly, executing a beach nourishment project through utilizing sand from marine borrow areas is considered within the scope of "mining activities" and therefore is subject to Mining Law (No: 3213 and its subsequent changes with the No: 5177) and its related Enactment [53]. It was stated in the Mining Law (Article 4) that *mines are under the decision and possession of the State. Furthermore, "sand and gravel which are used for the building and road construction and found in the natural environment are considered as "Group I" type of mines (Article 3). "Mining activities and permissions within …coastal areas and coastal belts, coastal economic zones, military zones… that need Environmental Impact Assessments are subject to the opinion of the related Ministeries and to the related enactment (Article 7). During the E.I.A. process, E.I.A. works by the Ministery of Environment and Forestry, and works related to other permissions for the Group I type of mines are given by the Provincial Bodies through tendering. Areas related to tender processes are determined through having positive decision of the General Directorate. Permits of Group I type of mines cannot exceed 10 hectares (Article 8)*



Sand and gravel in the seas are considered as Group I type of mines. Methods and principles related to tendering process, permits and control of those mines are determined by the related article. Permit period of those mines are limited to five years. However permit period can be extended in case that demand is made before the end of the permit period, and total permit period can not exceed 60 years. It is under the responsibility of the Council of the Ministers to extend permissions of more than 60 years (in the Law and in the related enactment: article no:28).

Organisational scheme

As beaches are dynamic systems and due to that experience significant short-term and longterm changes, for any beach nourishment project there is a need for a sound technical basis for its design, prediction, application and monitoring.

Execution of a beach nourishment project needs strong organisational capacity among the various parties that can be summarized as follows: science group, public/political group, design group, environmental protection group, control group, project execution group, funding and planning group, consultants and strategy group. Starting from the initial stages of the project to the completion, the client, the consultant, the project execution group and the strategy group are the key decision makers and there are mutual interactions among them [16].

"The type of the beach desired, quantity of the dredged material, equipment necessary for the preparation of the site, dredging and nourishment works, execution costs, final design of the project and tender as well as project execution and project analysis are the main considerations that should be detailly discussed by above-mentioned decision-makers. However for the successful completion of the project, client is responsible to provide necessary knowledge to the other third parties who, then will be responsible for the provision of the required data (Science Group), quantify the importance of the beach nourishment project to the tourism economy and to the society who are directly or indirectly affected by (Public/Political Group), establish a suitable and resistant beach type and profile (Design Group) etc." [16].

Investigation of site specific characteristics

Before the execution of the project, site specific characteristics, namely local erosion rate, local sand transport characteristics, environmental characteristics of the area under project and its hinterland, should be investigated.

An in-depth investigation of the ecological characteristics of the borrow area, and adjacent areas that can be negatively affected by the project is one of the important issues. Considering Mersin coastal zone, with a 260 kilometers in length Goksu River is the third largest river flowing into the Mediterranean from Turkey following the Seyhan and Ceyhan Rivers. Having a 10.000 square kilometers of surface area, it divides Goksu Delta (Specially Protected Area) into two parts on its way to sea.



On the western part of the river, there stands Paradeniz Lagoon with a 390 hectare area that was formed by the dynamic interaction of forces on the delta. The lagoon offers significant economic revenue to the economy of the region through traditional methods of fishing in contained waters. From this area onwards Incekum sand spit lays towards the south. Incekum sand spit is one of the most important sea turtle nesting beaches of the Turkish Mediterranean housing the Caretta Caretta and Chelonia Mydas. The sand spit was formed by the fluvials of the two currents: one from straight off shore and the other, south-westerly flowing current from Tasucu Bay. Behind this sand spit lays a fresh water lake, Akgol which is the delta's largest water body with a surface area of 1200 hectares. It offers a wealth of environment for the flora and fauna [54]. Kazanli Beach on the east, is one of the well-known turtle nestling beaches of the Mediterranean. Beside above-mentioned characteristics, design of successful and cost-effective beach nourishment schemes requires a sound understanding of the hydraulic character of both borrow material and native beach sand such as particle size, colour, mass density, borrow material compatibility. These should be investigated before any beach nourishment initiative. Taking necessary precautions on the coast during discharging of the sand onto the shore and giving utmost importance to the safety of people on board and on project site are other prerequisites. According to the information gathered from the 1/250.000 scale maps, designated military areas further south from the coast are other limitations for Mersin case. Therefore beside the environmental and ecological characteristics, military areas in this case should be taken into consideration whilst evaluating the borrow areas.

Investigation of the availability of the nourishment material

One of the prerequisites of beach nourishment projects is the availability of the sand either from nearby sand deposit areas in the sea or through port dredging. Utilising the sand deposits in the sea bottom is quite widely adopted approach in beach nourishment projects as long as the quantity and distance allows an acceptable project achievement. Environmental awareness in such cases is another important issue especially in the Mediterranean. Therefore, within last 5 years, sea bottom only after -40,00 - -50,00 meter depth is suitable in order to prevent possible disturbances to living habitat. Along the Mersin coast, within 1 mile distance from the coast, the sea depth changes between 0 - -60.00 meters. Opposite to the central development area of Mersin, sea depth changes between -10.00 - -12.00 meters within 1 mile distance. Towards the eastern coast along Kazanli, the average depth is between -5.00 - -7.00 meters and along the west coast this figure is almost -12.00 - -14.00 meters and further west it reaches to -20,00 - -30,00 meters (See Figure 1). After 10 miles from the coast opposite to Mersin centre, sea depth is between -65,00 - 75.00 meters. Whilst on the east, it is -50,00 - 75.00 meters. 60,00 meters, this figure is observed as -150,00 meters at the west. According to the report prepared by BeachMed Project, Mediterranean coastal shelf contains suitable quality of sand at depths of -20,00 - -30,00m. However these can rarely be used in practice as borrow areas due to that: the proximity to coastline may lead to further erosion, the presence of sea-grass (Posedonia Oceanica) that may be found along the large stretches until the depths of some -30,00 m., impacts on a diverse benthic community and fauna, and the quality of these sands (grain size wise) is not always optimal. So, the results show that the most usable sand deposits are to be found at depths of -40,00 m. or more and sometimes up to -100,00 - -120,00 m [24].





Funding

Initializing a possible beach nourishment project needs an awareness of funding possibilities. Financing beach nourishment projects is first of all under the responsibility of public and private sector. Therefore a certain percentage is provided by central and/or local government bodies as well as private stakeholder who in turn provide economic return from such projects such as hotel owners, tradesmen and mainly other tourism-related entrepreneurs. Considering that such a project will provide better recreational possibilities for the foreign and domestic visitors, a tourist tax / hotel tax could be applied to visitors utilizing the beach. This tax can be paid as a part of accommodation fee at the hotels by the visitors. Housing tax is another way that can be utilised for the purpose. The method can be applied according to the distance from the beach. In this case property owners within for example 0-500 m. distance to the beach will pay higher tax as compared to the ones living between 501 meters – 1 kilometer distance. Providing several entrances to the beach and certain amount for a daily visit to the beach will enable to provide some funding as well. Another method is to apply volunteer box which allows beach visitors to pay an amount volunteerly instead of paying a fixed amount.

Experimental Beach Nourishment Execution in Mersin

In this study, a series of assumptions are considered for an experimental beach nourishment execution: In the first assumption, it is considered that by law, necessary EIA studies have been done and certain sand borrow areas were identified to extract sand from the sea bottom. So, possible distance of the borrow area from the coast is accepted as 10 nautical miles and the depth of the area from which the sand will be extracted is accepted as -50.00 - -70.00 m. considering also the hopper capacity of dredgers suitable for the purpose. Second assumption is that the sand to be extracted from the borrow area is suitable to be integrated with the sand already present along the Pozcu coast or nearby areas.



There are two categories of costs in any beach nourishment project executions: Fixed costs which cover mobilization, demobilization and preparation of the project site etc. and weekly execution costs covering the costs of the dredging and auxiliary equipment, pipelines (rubber floating line and steel land line), reclamation, land-based equipment and survey and project management costs. Considering the coincidence of the fixed costs on any project there is always an economy of scale to be achieved. Assuming that nourishment will be carried out along 9 kilometer with a depth of 100 meters and an approximate beach slope of 1.50 meter, total quantity of sand that will be nourished becomes 1.350.000 m³ (150 m³ per linear meter). However considering the price limitations in any similar project, it is also possible to make the nourishment for a length of 4 km or 1.3 km. Then total quantity of the sand that will be used for the purpose becomes 600.000 m³ (150 m³ per linear meter) and 200.000 m³ respectively. Cost calculations according to all three scenarios are given in Table 2.

| COST DESCRIPTIONS | TOTAL QUA | NTITY TO BE D | ISCHARGED |
|-------------------------------------|--------------|----------------|----------------|
| | 200.000 m3 | 600.000 m3 | 1.350.000 m3 |
| EXECUTION | | | |
| Vessel - TSHD | € 312.000,00 | € 312.000,00 | € 312.000,00 |
| Tug boats | € 22.000,00 | € 22.000,00 | € 22.000,00 |
| Pipelines | € 16.000,00 | € 16.000,00 | € 16.000,00 |
| Reclamation | € 43.000,00 | € 43.000,00 | € 43.000,00 |
| Staff/survey / site office | € 27.000,00 | € 27.000,00 | € 27.000,00 |
| Tug boat assistance shifting sinker | € 25.000,00 | € 25.000,00 | € 25.000,00 |
| Total weekly cost | € 445.000,00 | € 445.000,00 | € 445.000,00 |
| | | | |
| | € | | |
| Execution costs ex w&t | 1.335.000,00 | € 4.005.000,00 | € 9.011.250,00 |
| w&t TSHD | € 56.000,00 | € 168.000,00 | € 378.000,00 |
| | € | | |
| Total cost | 1.391.000,00 | € 4.173.000,00 | € 9.389.250,00 |
| | € | | |
| TOTAL EXECUTION COSTS | 1.391.000,00 | € 4.173.000,00 | € 9.389.250,00 |

Table 2: Cost indicators of the execution of the beach nourishment [55].

| MOBILISTAION / DEMOB. COSTS | | | | | | | |
|----------------------------------|--------------|----------------|----------------|--|--|--|--|
| | € | | | | | | |
| Mob./demob. TSHD | 1.080.000,00 | € 1.080.000,00 | € 1.080.000,00 | | | | |
| Mob./install./dismantl./demob.of | | | | | | | |
| pipelines | € 480.000,00 | € 480.000,00 | € 480.000,00 | | | | |
| Demob. Miscl. Items | € 120.446,20 | € 120.446,20 | € 120.446,20 | | | | |
| Installation & preparation | € 260.000,00 | € 260.000,00 | € 260.000,00 | | | | |
| | € | | | | | | |
| TOTAL MOB/DEMOB/INST/DISM. | 1.940.446,20 | € 1.940.446,20 | € 1.940.446,20 | | | | |



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

Table 2: Cont.

| | € | | € |
|---------------------------------|--------------|----------------|---------------|
| TOTAL PROJECT COSTS | 3.331.446,20 | € 6.113.446,20 | 11.329.696,20 |
| Costs / m3 total | € 16,66 | € 10,19 | € 8,39 |
| | | | |
| Duration of work | 3 weeks | 8.5 weeks | 20 weeks |
| Weekly production of the vessel | 70.000 m3 | 70.000 m3 | 70.000 m3 |

Below photos show the coastal section of Pozcu where today there is no beach at all (left) and the same coastal section after a possible beach nourishment project execution.



Actual situation of the Pozcu Coastal belt nourishment

After an execution of the beach

Figure 2. Present situation of the Mersin coast (left) and the situation if a beach nourishment is executed (right)

It should be stated here that information gathered by local authorities reveals quite stable beach condition along the Pozcu coast in the past. Therefore after a possible beach nourishment execution along the coast, natural cycle of the beach will help to keep its condition stable for the future.

Possible Impacts of Beach Nourishment Project in Mersin

Impacts of any beach nourishment occur basically within three zones: supra-littoral or in other words dry part of the beach, the inter-tidal zone between mean high water and mean low water, and the sub-tidal zone. A forth area affected by the nourishment project is the sand source, namely borrow area [56]. Considering the supra-littoral zone, a wider beach provides better recreational facilities for its users. Although difficult to calculate recreational impacts, several studies have been conducted and methodologies have been developed over the past 30 years to overcome of calculating such benefits. Recreational benefits accrue to the daily users or tenants of properties in the form of reduced recreation costs, enhanced recreational and improved physical quality.



With the beach nourishment, further erosion will be prevented and thus additional beach will protect/prevent properties from destructive effects of wave actions. Therefore it will provide a positive economic impact. Besides, through access to the beach, certain benefits will be provided for the public. Local government which holds the property, will provide an economic return through renting that property to private sector who may run a beach establishment for a period. Therefore economic return will accrue to the local government.

Considering the case of Mersin a basic calculation can be made to understand possible return of the beach nourishment through running beach establishments. Considering that a total of 130.000, 400.000 and 900.000 m² of beach surfaces are created respectively, and considering that $12m^2$ beach area / person can be used as a standard value, then the capacity of the beach at any time will be 10,830 people; 33,330 people and 75.000 people accordingly. Furthermore, if for Turkish standards, appr. 3,00 Euro is spent for each unit of beach facilities for two people (sun umbrella and two stretchers), and two cycles in a day, then for the first case a total of 32,490 Euro/day and for other cases 99,900 Euro/day and 225.000 Euro/day can be gained. For a season (months of June, July and August - with 70% capacity for the weekends and 25% capacity week days), these figures become 1,127,000 Euro for a season for the first case and 3,467,000 Euro and 7,807,000 Euro for the second and third cases respectively. Assuming that 40% of it can be devoted to costs and 60% is devoted to operation profit for beach concession holders, and of that 15% goes to local authority as potential tax (appr. 100,000 Euro, 312,000 Euro and 700,000 Euro respectively), then within five years, only by tax revenues from beach establishments, 15%, 25% and 30% initial cost of beach nourishment can be recovered respectively.

Increased business revenues through improved beach facilities, increased tax revenues (which accrue to the locals), enhanced property values (for the property owners), increased property tax values (to the local government) and job creation (for the locality as a whole) will be other likely positive economic impacts of the nourishment for Pozcu coast as well.

Environmental impacts are also difficult to measure and economists generally assign a \$ value to the ecosystems in order to overcome this problem. One of the popular methods is the Contingent Valuation Method which is applied to determine the value of a day at the beach and beach users are asked how much they would be willing to pay to visit the beach. Travel – cost method and the unit day value or market price method are other methods appropriate to analyse the recreational impacts of beach nourishment projects. These methods can be utilised to value possible environmental impacts for Pozcu coast.

Within the supra-littoral zone, the creation of a wide and sandy beach may enhance or create a nesting habitat for sea turtles, for shore birds and create or protect habitat for shoreline vegetation. On the other hand, a potential negative effect that can occur within the supra-littoral and tidal zones is the disturbance by burial of fauna on which other species, such as birds feed. The extent to which the fauna are impacted depends upon the ability of individual species to recover from sudden burial after placement of beach fill. The temporary loss of such organisms from the beach may disturb the feeding habits of species that eat them [56].



"Similar impacts to fauna may occur within the sub-tidal zone, although more gradually as the project fill adjusts to its equilibrium shape. In addition, within this zone one tends to see more well developed hard-bottom reef communities. Potential impacts to reefs range from total burial to minor sedimentation as the project adjusts" [56].

When an offshore borrow area is used for sand extraction, bathymetric changes caused by the marine sand dredging actions have immediate effects on near-shore waves and currents. These hydrodynamic changes can rapidly lead change(s) in littoral transport patterns, bottom bathymetry, potential changes in water quality, increased turbidity and finally changes in the shoreline morphology. Near-shore dredging conducted without proper investigation of local morphologic conditions may cause significant and lasting physical and environmental damage to the coastal environment. The resulting damage may appear in the form of economic losses such as loss of natural resources and tourism revenues as well as irrecoverable ecological losses [57].

"Some short term impacts, such as burial of fauna at the project site are unavoidable. Other impacts can be minimized by appropriate project design and maintenance and / or mitigation. Impacts to sea turtles can be minimized in part by constructing outside of nesting season and tilling beach sand after construction to provide more natural compaction characteristics. Site specific conditions, including local regulations, provide guidance as to the relevant environmental issues and the actions necessary to mitigate potential negative impacts" [56].

In sum, above impacts are possible to occur throughout the process of beach nourishment. Beside above impacts, the coastal part of Mersin after nourishment will have an aesthetically better look and this will in turn help residents to be proud of their coast.

Remarks and Conclusions

Although its wide use along the Mediterranean countries in particular, beach nourishment projects have not been utilised in Turkey as a way to prevent coastal erosion and create better recreational possibilities. This paper puts forward the possibilities of an execution of such a project and presents the results.

A possible beach nourishment project along the Pozcu coast, Mersin will have potential short and long-term physical-ecological, socio-cultural and economic impacts. Execution of such a project will have a series of constraints which can be summed up as follows:

- For the successful execution and the completion of the project, high level of coordination is necessary among the parties involved in,
- there is an unavoidable need for the conservation of the flora and fauna during the project execution,
- monitoring the environment under effect before –during after the execution of the project is another necessity for providing environmentally acceptable results.



Although high cost level of such projects create some sort of financial burden at the initial stage, there are possibilities to recover the cost through applying various management methods in a relatively short time.

Acknowledgement

Authors wish to thank Mr. Jacques van der Salm for his valuable contributions and criticisms which helped increase the quality of this work.

REFERENCES:

[1] UNTWO (2006). UNWTO World Tourism Barometer, Volume 4, No. 2, June 2006, 10 pp.

[2] www.unwto.org/facts/menu.html. Facts and Figures: Information, analysis and know-how.

[3] European Commission (2004). Living with coastal erosion in Europe: Sediment and space for sustainability. Results from the Eurosion Study. Office for Official Publications of the European Communities, 2004, 40pp.

[4] Council of Europe (2003). Erosion of the Mediterranean coastline: Implications for tourism. Parliamentary Assembly, Document no.9981, 16 October 2003, pp.19.

[5] European Commission (2004). Living with coastal erosion in Europe: Sediment and space for sustainability. Part II: Maps and Statistics. Office for Official Publications of the European Communities, 2004, 40 pp.

[6] National Research Council (1995). Beach Nourishment and Protection.(in: http://books.nap.edu/books/0309052904/html), pp.352.

[7] Unal, O. (2001). Beach Regeneration Projects as a Way Towards Integrated Coastal Zone Management. The Cases of Anzio and Nettuno (Lazio Region), Italy. DRAVO S.A. Italy, Publication no: 2001/01, Rome, 2001.

[8] Díaz, G., Appendini, C.M., Medina, H.M., González, J.L., López, J.S., Palmeiro, A., Salgado, J.R., Salgado, J.R., Fernández, M. & Peñalver, F. (2003). Environmental restoration of Playa del Villananitos, Murcia, Spain. Proceedings of the Sixth International Conference on the Mediterranean Coastal Environment, MEDCOAST 03, Ravenna, Italy, E. Ozhan (ed.), pp 1583 – 1593.

[9] López, J.S., González, J.L., Vizcaíno, R., Medina, H.M., Appendini, C.M., Palmeiro, A., Díaz, G., Calleja, M. (2003). Littoral defence system redefinition at La Mamola Beach, Spain. Proceedings of the Sixth International Conference on the Mediterranean Coastal Environment, MEDCOAST 03, Ravenna, Italy, E. Ozhan (ed.), pp 1595 – 1616.

[10] Loudiziou, X.I. & Iacovou, N. (1999). Anthropologenic coastal erosion and shoreline management in Cyprus. MEDCOAST 99 – EMECS 99 Joint Conference. Land – Ocean Interactions: Managing Coastal Ecosystems, November 9-13, Antalya, Turkey, E.Ozhan (ed.), pp.1501-1509.

[11] Philips, M.R. & Jones, A.L. (2006). Erosion and tourism infrastructure in the coastal zone: Problems, consequences and management. *Tourism Management*, Vol: 27, Issue: 3, pp. 517-524.

[12] van Oorschot, J.H. & van Raalte, G.H. (1991). Beach nourishment; execution methods and developments in technology. *Coastal Engineering*, Vol: 16, Issue: 1, pp. 23-42.



[13] Pacini, M., Pranzini, E. & Sirito, G. (1997). Beach nourishment with angular gravel at Cala Gonne (East Sardinia), Italy. Proceedings of the Third International Conference on the Mediterranean Coastal Environment, MEDCOAST 97, Qawra, Malta, E. Ozhan (ed.), pp 1043 – 1058.

[14] Preti, M., Lamberti, A.& Martinelli, L. (1997). Analysis of a sand sac submerged barrier: Case of a beach in Riccione. Proceedings of the Third International Conference on the Mediterranean Coastal Environment, MEDCOAST 97, Qawra, Malta, E. Ozhan (ed.), pp 1059 – 1072.

[15] Cipriani, L.E., Pellicia, F. & Pranzino, E. (1999). Beach nourishment with nearshore sediments in ahighly protected coast. MEDCOAST 99 – EMECS 99 Joint Conference. Land – Ocean Interactions: Managing Coastal Ecosystems, November 9-13, Antalya, Turkey, E.Ozhan (ed.), pp.1579-1590.

[16] van der Salm, J. & Unal, O. 2001. Towards a Common Mediterranean Framework for Potential Beach Nourishment Projects. Proceedings of the Fifth International Conference on the Mediterranean Coastal Environment, Hammamet, Tunisia, MEDCOAST 01, E. Ozhan (ed.), pp. 1333 – 1346.

[17] Appendini, C.M., Medina, H.M., González, J.L., López, J.S., Palmeiro, A., Díaz, G., Salgado, J.R., Diez de la Cortina, R.G. (2003). Beach erosion and nourishment of Playa de Mazagon, Spain. Proceedings of the Sixth International Conference on the Mediterranean Coastal Environment, MEDCOAST 03, Ravenna, Italy, E. Ozhan (ed.), pp 1571 – 1581.

[18] Unal, O. (2003). Implications for beach nourishment projects along the Emilia-Romagna Coast. Proceedings of the Sixth International Conference on the Mediterranean Coastal Environment, MEDCOAST 03, Ravenna, Italy, E. Ozhan (ed.), pp.1345 – 1356.

[19] EuDA (2004). Beach nourishment in perspective: The Mediterranean Case. Presentation made during the BeachMed Convention, August 2004, Rome, Italy, pp.70.

[20] van der Salm, J. (2004). Tecniche e limiti delle attrezzature di dragaggio" Presentation made for the BEACHMED Convention, 02 December 2004, Roma, Italy.

[21] Wang, N. & Gerritsen, F. (1995). Nearshore circulation and dredged material transport at Waikiki. *Coastal Engineering*, Vol. 24, Issues: 3-4, pp. 315-341.

[22] Munoz-Perez, J.J., DE San Roman-Blanco, B.L., Gutierrez-Mas, J.M., Moreno, L. & Cuena, G.J. (2001). Cost of beach maintenance in the Gulf of Cadiz (SW Spain). *Coastal Engineering*, Vol: 42, Issue: 2, pp. 143-153.

[23] Preti, M. & Albertazzi, C. (2003). Complex sand nourishment in Emilia-Romagna region. Proceedings of the Sixth International Conference on the Mediterranean Coastal Environment, MEDCOAST 03, Ravenna, Italy, E. Ozhan (ed.), pp 1639 – 1648.

[24] BeachMed (2004). Maintenance and repair of sandy beaches using marine sand deposits: Technical and economic considerations. BeachMed Project Phase "B", Technical Report, 24 pp.

[25] Sarda, R., Pinedo, S., Gremare, A. & Taboada, S. (2000). Changes in the dynamics of shallow sandy-bottom assemblages due to sand extraction in the Catalan Western Mediterranean. *ICES Journal of Marine Science*, Vol: 57, Issue: 5, pp.1446-1453.

[26] Fanelli, E., Nicoletti, L., Franceschini, G., Giovanardi, O., Gabellini, M. & Preti, M. (2003). Environmental impact assessemnt after sand extraction for beach nourishment: a methodological approach. Proceedings of the Sixth International Conference on the Mediterranean Coastal Environment, MEDCOAST 03, Ravenna, Italy, E. Ozhan (ed.), pp 951 – 958.



[27] Benedet, L., Finkl, C.W., Campbell, T. & Klein, A. (2004). Predicting the effect of beach nourishment and cross-shore sediment variation on beach morphodynamic assessment. *Coastal Engineering*, Vol: 51, Issues: 8-9, pp. 839-861.

[28] Simonini, R., Ansaloni, I., Bonvicini Pagliai, A.M., Cavallini, F., Iotti, M., Mauri, M., Montanari, G., Preti, M., Rinaldi, A. & Prevedelli, D. (2005). The effects of sand extraction on the macrobenthos of a relict sands area (northern Adriatic Sea): Results 12 months post-extraction. *Marine Pollution Bulletin*, Vol: 50, Issue: 7, pp. 768-777.

[29] Szymelfenig, M., Kotwicki, L., & Graca, B. (2006). Benthic re-colonization in postdredging pits in the Puck Bay (Southern Baltic Sea). *Estuarine, Coastal and Shelf Science*, Vol: 68, Issues: 3-4, pp. 489-498.

[30] Roelse, P., Coosen, J. & Minneboo, A.J. (1991). Beach nourishment and monitoring programme. Coastal Engineering, Vol: 16, Issue: 1, pp. 43-59.

[31] Lechuga, A., Spanhoff, R., Dette, H., Caseu, J., Moulis, D. & Kroon, A. (1998). Monitoring of nourishment projects (in: http://aqua.tvrl.lth.se/hh/safe/PAP2/pap2.htm), pp.16.

[32] Tagliente, M., Randazzo, G., Buonmestieri, S., Biondi, G. & Alessandro, G. (2003). Monitorino of Ragusa coastal area (SE Sicily). Proceedings of the Sixth International Conference on the Mediterranean Coastal Environment, MEDCOAST 03, Ravenna, Italy, E. Ozhan (ed.), pp 1517 – 1524.

[33] Black, D.E., Donnelley, L.P. & Settle, R.F. (1990). Equitable arrangements for financing beach nourishment projects. *Ocean and Shoreline Management*, Vol: 14, Issue:3, pp. 191-214.
[34] Edwards, S.F. & Gable F.J. (1991). Estimating the value of beach recreation from property values: An exploration with comparisons to nourishment costs. *Ocean and Shoreline Management*, Vol: 15, Issue: 1, pp. 37-55.

[35] Daniel, H. (2001). Replenishment versus retreat: the cost of maintaining Delaware's beaches. *Ocean and Coastal Management*, Vol: 44, Issues: 1-2, pp. 87-104.

[36] Houston, J.R. (2002). The Economic Value of Beaches – A 2002 Update. Shore and Beach, Vol.70, No:1, pp.9-12.

[37] Brandolini, S.M.D & Zanuttigh, B. (2003). Economic and Social valuation of beach protection in Lido di Dante (Italy). Proceedings of the Sixth International Conference on the Mediterranean Coastal Environment, MEDCOAST 03, Ravenna, Italy, E. Ozhan (ed.), pp 319 – 330.

[38] Parsons, G.R. & Noailly, J. (2004). A value capture property tax for financing beach nourishment projects: an application to Delaware's ocean beaches. Ocean & Coastal Management, Vol. 47, Issues: 1-2, pp.49-61.

[39] Ruol, P., Capobianco, M. & Tondello, M. (1997). Physical model tests in the framework of beach nourishment performance evaluation. Proceedings of the Third International Conference on the Mediterranean Coastal Environment, MEDCOAST 97, Qawra, Malta, E. Ozhan (ed.), pp 1073–1088.

[40] Ozhan, E. (2002). Coastal erosion management in the Mediterranean: An Overview.
UNEP Priority Actions Programme, Regional Activity Centre, Ankara/Split, May 2002, 25 pp.
[41] Ozaner, S. (2004). Turkiye'nin kiyi erozyonu tehlikesi buyuyor. (Coastal erosion danger of Turkey is growing). (in: http://basin.tubitak.gov.tr/eylul2004/17).

[42] Cetin, H., Bal, Y., & Demirkol, C. (1999). Engineering and environmental effects of coastline changes in Turkey, northeastern Mediterranean. *Environmental and Engineering Geoscience*, Vol.5, No:3, pp.315-330.



[43] Yuksek, O., Onsoy, H., Birben, A.R. & Ozolcer, I.H. (1995). Coastal Erosion in Eastern Black Sea Region, Turkey. *Coastal Engineering*, Vol. 26, No. 3-4, pp.225-239.

[44] Mersin Tourism Department Report, 2003.

[45] Duman, T. & Yağcı, M.I. "Mersin'in Turizm Gelirlerini Arttırmak İçin Ne Yapmalı?", *Anatolia: Turizm Araştırmaları Dergisi*, 15 (1), (2004).

[46] Mersin Tourism Promotion Office Report, 2006.

[47] www.turizmgazetesi.com/news/news.aspx?id=33281

[48] MTSO Report (2004). Problems of Mersin and Solutions. Mersin Chamber of Commerce and Industry Publications.

[49] Mersin Almanac 2005. Published by Mersin Governorship, Ekin Group: Istanbul

[50] Sayilgan, Cansel (2006). Mersin Metropolitan Municipality Planning Department Manager. Personal Interview, October 16.

[51] Official Gazette of Turkey (2003). Enactment for the Environmental Impact Assessment. 16.12.2003.

[52] Official Gazette of Turkey (1983). Environmental Law. 09.08.1983.

[53] Official Gazette of Turkey (2005). Mining Law and its related Enactment. 03.02.2005.

[54] DHKD (?). The Goksu Delta: Anatural Wonderland. Dogal Hayati Koruma Dernegi (The Society for the Protection of Nature), Istanbul, Turkey, 17 pp.

[55] van der Salm, J. (2004). Private archive on beach nourishment projects and tenders.

[56] www3.csc.noaa.gov. Beach Nourishment: A Guide for Local Government Officials.

[57] Otay, E.N., Work, P.A. & Borekci, O.S. (2000?). Effects of marine sand exploitation on coastal erosion and development of rational sand production criteria. In

ww.ce.boun.edu.tr/Otay/Kilyos/pdf/MarineSand.pdf.



IN THE CULTURE-ENVIRONMENT RELATIONSHIP FRAMEWORK PEARL MULLET FISHING IN THE LAKE VAN

Solmaz KARABAŞA

Kültür ve Turizm Bakanlığı/Araştırma ve Eğitim Genel Müdürlüğü İ.İnönü Bulv. No:5 Kat:10 Emek/Ankara skarabasa@yahoo.com

As a biologic creature the human being, has been tryign to find ways to satisfy his/her basic needs like the nutrition, sheltering etc. These efforts helped human being to become a cultural creature and today, with a rich cultural haritage.

In the process of formation of culture which we call as 'life style', culture-environmet relationship has an important role. While the environment effecting cultural development and cultural diversty, human also have changed and re-formed the environment. In this aspect, the relationship between culture and environment shows diversity depending on time and geography. Unfortunately, the nature of these interactions have been causing serious problems in our times. A detailed analysis of these problems can help us to learn more on how to reach a sustainable life.

This was the aim of the field survey realised in 2004, on the communities settled around the Van Lake. The Van Lake, is the natural habitat of an endemic fish called 'İnci Kefali' (chalcalburnus tarichi) people living in the area have been fishing and consuming the fish as a food for centuries. Today, chalcalburnus tarichi population is seriously under the risk of disappearation due to excess hunting. The guestion here is, while there was no threat on the survival of this fish before last decades, what has been changed and why there is such a risk today? The aim of this presentation is to assess the data collected in 2004, in the villages around tha Van Lake with the 'The New Ecological Anthropology' approach and to discuss which is searching answers above the questions. The study is going to start with an historical view of culture-environment relationship, and take the threat on the sustainability for chalcalburnus tarichi in the Van Lake as a case study to examine the problems in detail. The survey in question is mostly based on the etnographic study and is used face to face interview technic.

Introduction

As a biologic creature the human being, has been trying to find ways to satisfy his basic needs like the nutrition, sheltering etc. These efforts have helped human being to become a cultural creature and today, human being has a rich cultural haritage. In the process of formation of culture which we call as 'life style', culture-environmet relationship has an important role. While the environment is effecting culture and cultural diversity, human also have changed and re-formed his environment. But, it is seen that there are differencies between today and past culture-environment relationship. Unfortunately, there are some problems today. A detailed analysis of these problems can help us to learn more on how to reach a sustainable life.



Ecological anthropology can help us to analyse these problems. Ecological anthropology focuses upon the complex relations between people and their environment. (Salzman and Attwood 1996:169). The ecological anthropology was named as such during the 1960s and the ecological anthropology of the 1960s was known for its functionalism, systems theory and focus on negative feedback. Cultural practices were seen as optimizing human adaptation to their environments. But today's population increase and high-tech-mediated transnational flows of people, commerce, organizations and information are forcing us rethink old assumptions. It is much more evident today, there are no isolated ecosystems and all humans participate in a world system. (Kottak, 1999).

Thus, in this study the new ecological or environmental anthropology approach which blends theory with political awareness and policy concerns is applied.

The ethnografic field work which is done for the UNDP project, realized between from 2 to 4 August 2004, among the communities settled around the Lake Van. This settlements were Çelebibağ, Çitören, Dereağzı, Engilsu, Gölağzı, Karahan and Yalındüzü. In these settlements, deeply interviews have been done with specifically chosen people.

The Study Area

Van is located in the East Anatolia, surrounded by Ağrı from North, Lake Van and Bitlis from West, Siirt, Şırnak and Hakkari from South, Iran Border from East. It covers 21.823 km² together with the Lak Van. Altitude is appoximately 1725 m.

Van's climate is short and hot in summer, long and snowy in winter. The province is a predominantly steppeland.

The region's history goes back to the Chalcolitik Age (5th millennium B.C.). But it gained importance by the Urartians in the 9th and 8th centuries BC. Urartians were good at viticulture, horticulture, irrigation, weaving and architecture.

Van's economy is based on agriculture today. Income per person is considerably low in comparison with Turkey's average. In terms of economic development, Van, which is in 23rd order between Turkish cities in 1945, set back to the 67th order in 1997 (DPT 2001). On the other hand, the population is increasing. Due to high birth rate in the area, while Turkey population grows by 1.6, Van's by 2.2.

The Lake Van and Pearl Mullet

The Lake Van, which is the largest lake in Turkey with 3.172 gqkm, situated between 38"14'-39"05' North latitudes and 42"15'-43"44' East altitudes. Above sea level is 1.046 and the maksimum depth is 450 m.


The Lake Van is an interesting ecosystem in the world that its water contain saline-soda and has original biodiversity. Lake has highly alkaline and salty water. As a result of this, lake which has 9.8. pH, is known as alkaline lake and not suitable for either freshwater fish or marine fish. There is only one type of fish lives in the lake known as Van Fish or Pearl Mullet (chalcalburnus tarichi), wich is a member of cyprinidae family, its mean length is 19.5 and mean weight is 80 gr. Pearl Mullet is an immigrant type fish that normally lives in lake water, but at the breeding period they travel to the fresh water streams between April and July and turns back to the lake after laying eggs. While immigrating towards the streams the polulation is higly accumulated in the rivers mouths. This makes them very easy to catch.

Pearl Mullet is in IUCN red list since 1996. Because there is overfishing in Lake Van in last decades. This is coused to some legal prevention since 1980 and today there is fishing ban between 15 April and 30 June.

Fishing Practices and Techniques

There are two types of fishing. One of them is winter fishing. Winter fishing has started in 1970s. In this type fishing it is used boat and fishnet. Today mostly Dereağzı Village and some other villagers of bay of Van have done winter fishing.

The other one and the traditional type is breeding season fishing. The historical sources are quite limited for the traditional fishing in the Lake Van. Evliya Çelebi gives the oldest knowledge (from 16th century) about fishing in the Lake Van. He mentions that there were a kind of fish in the Lake Van and this fish immigrated to Bend-i Mahi stream a month in the year. Additional to this; the fishes while going back to lake, were catched and stocked via salting for selling later (Çelebi, 1976).

In contrary to this today this Pearl Mullet is fished before to leave their eggs. In Gölağzı, Mehmet Arslan who is 77 years old and one of the oldest fishermen's said that the Pearl Mullet has been fished before to leave their eggs every time. Breeding season fishing has been persuaded about 3 mounth (from April to June) by starting fish trade. There are some techniques used in traditional fishing. Fish baskets are the oldest fishing tools (Deveciyan, 2006:390). In addition to this fish has been cathed by hand from the stream. Old fisherman Mehmet Aslan said that they have used a tool which is made from hemp plant in the past.

Today, in breeding season fishing, it is used boat and various fishnet (like'ığrıp', 'fanyat') from rivers mouth, stream dikes in the Lake Van.

Economic Assessment

In region there is economic problems. 'Gurbetçilik (seasonal workmenship)' is shows it obviusly. In all the villages in the study area, there is seasonal workmenship which causes these people go abroad temporarily for working. From Engilsu, Nurettin Yiğit (38 years old) has done the 'gurbetçilik'. But 63 years old Mehmet Yiğit has not gone to 'gurbet'. Because in his times, the agriculture (and stockbreeding) were enough.



During Russians occupation of the Van region in the beganing of past century, Çelebibağlians have been taken to Muğla region. But the Russians return, Çelebibağlians come back their region. Because the Pearl Mullet was the easy and ready food for the nutrition.

Today economic conditions of Van are not sufficient in general. In detail, the villages which are settled around Lake Van have some differencies in terms of livelihood ways and incomes (Fig. 2). In general, the southern villages are advantageous such as Dereağzı village which has irrigation facilities for good agriculture.

In addition to this villagers in Dereağzı are making winter fishing. So Dereağzı village's economy are better than northern villages which makes insistently breeding season fishing.

There are 14.000 people around the Lake Van whose livelihood is fishing. In 2002, there were 160 winter fishermen, 45 breeding season fishermen (Sarı, 2003:11).

| Name of Village | Population [*] | Style of Livelihood |
|-----------------|--------------------------------|-------------------------------------|
| Dereağzı | 1400-1500 | Horticulture, fishing, |
| | | beekeeping etc. |
| Engilsu | 950 | Seasonal workmenship, |
| | | agriculture and cattle-dealing, |
| | | fishing |
| Çitören | 1000 | Seasonal workmenship, cattle- |
| | | dealing, agriculture of grain and |
| | | fishing. |
| Cumhuriyet St. | 6000 | Agriculture (horticulture, fishing |
| (Çelebibağ) | | |
| Karahan | 1700-1800 | Fishign, seasonal workmenship, |
| | | carpet weaving, agriculture, |
| | | cattle-dealing. |
| Gölağzı Mh. | Over 2000 | Horticulture, viticulture, fishing, |
| Yalın Düz | 1000 | Agriculture, seasonal |
| | | workmenship, cattle-dealing, |
| | | fishing. |

Figure 2: Population and Livelihood Strategies of The Study Area.

Evliya Çelebi, who was a famous historian, mentioned in his notes that Pearl Mullet had sold to Iran, Nahcivan and Azerbaijan during 16th century. From this commerce 900 akçe (Ottoman currency) income has taken per a year and given to the soldiers in the area.

^(*) The numbers doesn't represent exact quantities.



From then on, Pearl Mullet has consumed by the people around the Lake Van primarily for nutrition till the second half of 19th century. The trade of Pearl Mullet has started again in the 1950's (Sarı 2001:26).

Deveciyan informed that in 1920's, totally about 720 tonnes fish have been hunted 240 tonnes of which from Ahlat (total of inci balığı and sazan) and 480 tonnes of which from Van. The total allowable fishing quantities have been calculated as 8.400 tonnes. The production of Pearl Mullet is raised gradually from 600 tonnes (1967) to 12.387 tonnes (1994) (Sarı, 2001:30). Obviously there is overfishing when compared to lately figures. Today, Pearl Mullet population is seriously under the risk of depletion due to excess hunting.

Since the closest seashore is 1000 km away and more than 10.000 tonnes of yearly produced of Pearl Mullet, the fish requirements of region is satisfied by Pearl Mullet. So the Pearl Mullet is both income and food resource for the region. A survey results about fish cunsumption habits shows that %88.2 of people (among the contrubuted to survey) enjoyed to consume Pearl Mullet. (Sarı, Demirulus, Söğut 2000).

While only 10 % of the fishing activities are done during the winter out of reproduction period, the 90% of the fishing is done during the immigration period. In total, 14.000 people depends on Pearl Mullet for their living. In 2002, a year income of Pearl Mullet selling was around 10 trillion TL (Sarı,2003:11).

The Fish Preserving, Stocking and Consumption Habits of Van Region

The people living in the area have been fishing and consuming the Pearl Mullet as food for centuries and they have found some methods to consume it like fish salting, fish drying, fish cooking.

Fish Salting: While the Pearl Mullet is eaten fresh in spring, the rest of the year is eaten in salted form. The salt has been the best way of storing of the food since Egyptians (Kurlansky 2003:41). Also in this province salting is used to store fish as it is done in the old times.

The fish is washed and put in washbowl. In washbowl fish is salted and left waiting for 2-3 days. After 3 days the washbowl is fulled by water coming from the fish itself. Then, fish is taken from washbowl to lay into a basket, colander or any metallic strongbox. The process continues by sprinkling salt to the bottom of metallic strongbox and then fish is laid down to the top of the box. When the fish placing is finished, strongbox is taken to a cool place.

Fish is salted in April and May. For every box nearly 5 kilos salt is used. The villagers said that every family have stored the salty fish on the average 2-3 strongbox in the past. One box is approximetly 15-17 kilos.

Fish Drying: In the very old times, in addition to salting, fish is dryed for storing long times. Today, old womens says; the young generation are modernized and not doing salt or dryed fish.



Fish cooking: Salty fish is cooked mostly in the 'tandır' which is a kind of oven made in a hole in the soil. After the bread has cooked in 'tandır', salty fish is cooked above the ember.

As for the fresh fish; it is cooked by stick to 'tandır'. But before this, fish is waited for a while under the sun, then is covered with floury water (or yoğurt and floury water) by one side to stick into 'tandır'. When the fresh fish is cooked before eating, the fish is broken and discharged salty water in or cooked fish is salted and waited for 3-4 hours.

Eating Habits:

Salty fish is delicious with pilaff. As for the people of the region, 'keşkek' (made from chickpea and wheat) is the indispensible side dish near the salty fish. Relating to this a villager; "salty fish go with the 'keşkek', it is salty fish's friend". Another villager also said that "Pearl Mullet likes 'ayran". Some villagers declares "fish is eaten with 'ayranaşı (wheat and chickpea with yoğurt)".

Pearl Mullet is eaten with fresh-baked which makes possible to eat together.

Additionaly, eating salty fish with fruits like grape, melon, water melon etc. is the most commen habits.

Conclusion

The people in the area have fished the Pearl Mullet as food for centuries. Especially at the hard times of First World War, Pearl Mullet have been life-saver. These cultural practices are not the threat as far the last decades.

But today's needs and standards are totally different from the past. As it happens all around the world, Van region's people participate in a world system. Because of the province developing level and high population rate and in addition to this modern life needs, in the study area, there is a livelihood problem today. Both increasing population and raising needs obligate the peoples to earn much more money. People not only fishing to eat but also fishing to sell. Evenmore they want to catch more than the last time. Thus people and culture have became a threat.

Bibliography

Karabaşa, (2001). "Kültürel Yapı Raporu". Sürdürülebilir İnci Kefali Balıkçılığı için Yerel Sosyo-Kültürel Yapıya Göre Alternafif Geçim Kaynaklarının Geliştirilmesi Gef-2 (UNDP) Projesi.

Kottak, C.P. (1999). "The New Ecological Anthropology" American Anthropologist. 101 (1):23-35

Kurlansky, M. (2003), Tuz. (Çev: Ali Çakıroğlu) İstanbul: Aykırı Yayınları

Mehmet Zillioğlu Evliya Çelebi (1976) *Evliya Çelebi Seyahatnamesi* Baskıya Hazırlayan: Mümin Çevik. Sadeleştirenler: Tevfik Temelkuran, Necati Aktaş C:3 İstanbul.



Sarı, M., H. Demirulus ve B. Söğüt (2000) "Van İlinde Öğrencilerin Balık Tüketim Alışkanlığının Belirlenmesi Üzerine Bir Araştırma". *Doğu Anadolu Bölgesi IV. Su Ürünleri Sempozyumu*. 28-30 Haziran 2000. Erzurum.

Sarı, M. (2000) Van Gölü İnci Kefali. Stok Miktarının Tahmini ve Balıkçılık Yönetim Esaslarının Belirlenmesi. İstanbul: ÇEKÜL yayınları.

Sarı, M (2003) İnci Kefali. Bilgiler ve Mevzuat Çekül ve Ay Yaban Hayatı Vakfı Yayını



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



A SUSTAINABLE WASTE WATER MANAGEMENT PROJECT: MEDAWARE

Filiz DILEK, İpek İMAMOĞLU, Gülerman SÜRÜCÜ and Celal F GÖKÇAY¹

Middle East Technical University, Dept. of Environmental Engineering, Ankara/Turkey, cfgokcay@metu.edu.tr

The MEDAWARE Project was initiated by the collaboration of 7 Med countries in 2003. The main aim of the project was to develop tools and guidelines for the promotion of the urban wastewater treatment and reuse in the agricultural production in the Mediterranean countries for a sustainable environment and resources. Within this scope METU team undertook an inventory of the urban wastewater treatment plants (WWTP) in Turkey [1]. The gathered information indicated that of the 5-6 billion m³ wastewater produced yearly in Turkey, around 1.6 billion m³ receives some degree of treatment and approximately 1 billion m³ is currently being secondary treated. Of this amount only 123 million m³, originating mainly from two municipality WWTPs, is being used in direct irrigation of crops. Effluents in both applications do not meet the national and international reuse water standards. Most Mediterranean countries have neither wastewater reuse standards nor criteria. However a regulation-bulletin for reuse, directly adapted from US-EPA, was put into effect as of 1991 in Turkey. The Turkish bulletin, is fairly advanced by the current concepts, however lacks technology based stipulations but in the same time unrealistically stringent in terms of microbiological criteria. A criteria proposed for the MED countries, developed purely on scientific bases and risk assessment calculations in 2000, may be adopted in Turkey for a more realistic and pragmatic approach to reuse treated wastewaters in crop irrigation.

Water Statistics for Turkey

According to State Hydraulic Works (DSI-2001) of Turkey the total annual freshwater potential of Turkey is around 187 billion m^3 . Around 30-35 billion m3 is being used for irrigation and 6 billion m^3 as freshwater supply for the urban settlements. Sources of freshwaters used in Turkey is given in Table 1. Waste Water Statistics and Waste Water Treatment in Turkey

As of 2004, total of 129 urban wastewater treatment plants (WWTP), serving for populations greater than 3 000 pe, exist in 43 cities. According to the 2001 Turkish State Institute of Statistics (SIS) figures, 35% of the total population is being served by urban wastewater treatment plants in Turkey This figure is increasing year by year as it was mere 20% in 1994. Nine treatment plants employ advanced wastewater treatment; 37 have some form of biological treatment (activated sludge, trickling filter, stabilization pond systems) and 13 utilize only physical treatment. Wastewater treatment statistics are summarized in Figs. 3-5. It has been estimated that annually



| | Rural Withdrawal distribution (%) (Total water amount: 164 x 10 ⁶ m ³) | Urban Withdrawal distribution (%) (Total water |
|---------|---|---|
| Spring | 24.3 | 22.1 |
| Lake | 0.53 | 10.3 |
| River | 1.54 | 2.21 |
| Dam | 4.90 | 39.6 |
| Groundw | 67.4 | 24.1 |
| Pond | 0.37 | 1.57 |
| Other | 0.96 | 0.12 |

Table 1. Water Withdrawal in Turkey (DSI-2001)



Figure 2. Breakdown of WWTPs in Turkey





Figure 3. Capacity Distribution of WWTPs



Figure 4. Disitribution of Biological Technologies in NumbersCAS: Conventional Act. Sludge; EAS: Extended Aeration Act. Slu; TF: Trickling Filter.; BF: Biyological filters.; NR: Nutrient treatment.; SBR:Sequencing Batch reactor

Total of 1.6 billion m^3 of domestic wastewater receive some form of treatment, of which 1 billion m^3 receive secondary treatment. This figure is important in that secondary treated wastewaters may be reused in agriculture upon additional treatment When treated effluent quantities are considered, 13.7% of the urban wastewaters are being treated at advanced level for organics and nutrient removal



The 73.5% and 12.8% of wastewaters are treated by biological and physical treatment methods, respectively. Data from 56 treatment plants indicated that 64 % of these discharge their effluents

into streams and rivers. Approximately 21 % of the plants practice marine disposal (into Black Sea or Mediterranean) and remainder discharge into drainage and irrigation canals, lakes, reservoirs and on land. [1]

Wastewater Reuse

In terms of sustainable environment, reuse of treated wastewaters in agriculture is poorly practiced in Turkey. The wastewater reuse is accomplished through "direct" and "indirect" irrigation. "Direct" is to mean the reuse of effluents directly in agriculture for irrigation, whereas "indirect" indicates reuse through a receiving body. Among the studied WWTPs; Eskisehir

WWTP (24,820,000 m^3/year) and Gaziantep WWTP (73,000,000 m^3/year) effluents are directly being used in irrigation of farm land of 50,000 and 80,000 hectares, respectively. In the two reuse practices effluents do not conform with the recognized reuse standards in the world. As a result the highest gastrointestinal disease rate is observed in Gaziantep province of Turkey as shown in

Fig. 6. Although some of the WWTP administrations claimed no reuse for disposal, evidently their discharges are being indirectly used in irrigation as shown in Table 2. There is also indication that at regions where improper reuse being practiced for agricultural irrigation the incidence rates of gastrointestinal diseases are the highest in the country. For example, as can be seen from Fig. 8 that South Eastern Region (GAP) of Turkey appears as the most problematic having cities with incident risk values above that average for Turkey (0.093%) [1].



Figure 5. Combined chart showing locations of WWTPs and % risk of water-borne diseases occurrences in Turkey



 Table 2. Reuse of Treated Wastewaters in Central, Eastern, SouthEastern, Western Blacksea and Mediterranean Regions in Turkey

| Province | Place | Name of plant | m3/a | Receiving environ. | Irrigation status |
|-----------------------------------|----------------|---------------------------------|----------------|-----------------------|----------------------|
| Aksaray (Primary t.) | Merkez | Aksaray Municipality WWTP | 9 125 000 | Karasu Stream | INDIRECT * |
| Ankara | - | ASKI, Ankara Municipal. WWTP | 192 695 545 | Ankara Creek | INDIRECT * |
| Eskisehir ** # | - | ESKI, Municipality WWTP | 24 820 000 | Porsuk River | INDIRECT * |
| Gaziante p ** # | - | GASKI , Municipality WWTP | 73 000 000 | S. Creek | DIRECT |
| lgdır (aer. Stabilizat ion) | Merkez | Igdır Municipality WWTP | 551 880 | Aras River | DIRECT |
| Kayseri # | - | Kayseri Municipality WWTP | 32 850 000 | Karasu River | INDIRECT |
| Adana | Kozan | Kozan Municipality WWTP | 2 780 000 | Kozan Creek | INDIRECT |
| Adana | Yumurta lık | Yumurtalık Municipality WWTP | 48 000 | Ayas Creek | INDIRECT |
| Konya | Ilgin | Ilgın Municipality WWTP | 2 838 240 | Bulasan River | INDIRECT |
| Nevsehir | Urgup | Urgüp Municipality WWTP | | Damsa Creek | INDIRECT |
| İzmir # | Merkez | IZSU Municipality WWTP | 182 500 000 | Izmir Bay | ? |



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



Figure 6. The Photograph of the VRM Type MBR Plant in METU Campus, Ankara

Recently a membrane treatment plant, MBR, shown in Fig. 7, has been commissioned in METU campus in Ankara, where effluents are sterile and free from organics and are suitable for unrestricted irrigation. Currently MBR treated effluents are being used for lawn irrigation in the campus. The MBR plants in the world are growing in number and are due to be technology standards for treatment and reuse of wastewaters.

Cost of Treatment and Reuse

Cost of secondary wastewater treatment in Turkey has been studied within the MEDAWARE project. Treatment costs of domestic effluents in different processes is summarized in Table 3. As can be seen from this figure, in terms of initial investment, conventional activated sludge and denitrifying oxidation ditch are the least costly. Whereas denitrifying activated sludge and extended aeration modifications are comparable with each other, provided that 266.2 \in is excluded from the comparison. This figure belongs to recently constructed plant in Fethiye which does not exactly represent the true figure of construction for such a plant. The most costly is the MBR process. However MBR process is a form of tertiary treatment and may not directly be compared with the others.

In terms of operational costs more or less the same ranking is applicable. It should be noted that secondary treatment, with or without nutrient treatment, produces effluents unfit for unrestricted irrigation from microbiological point of view. Whereas MBR plants produce effluents which are suitable for unrestricted irrigation.



| Treatment Technology | Initial Cost (€/capita) | Unit Operational Cost (€/m ³) |
|----------------------------------|----------------------------|--|
| Conventional activated sludge | 13.76 – 46.67 | 0.0146 – 0.0903 |
| Denitrifying activated sludge | 32.30 – 266.2 | 0.0473 – 0.0553 |
| Extended Aeration act. sludge | 29.00 – 49.85 | 0.0320 – 0.1260 |
| Denitrifying oxidation ditch | 12.72 – 83.47 | 0.0528 – 0.1534 |
| Vacuum membrane reactor MBR * | 250 - 330 | 0.13 € electricity 0.45 € elctrcity + |

Table 3. Comparison of treatment costs for domestic effluents

* based on METU MBR plant experience

Wastewater Reuse Standards

Most Mediterranean countries have neither wastewater reuse standards nor criteria. However the 'Technical Aspects Bulletin' (Official Gazette dated 7.1.1991, no. 20748), linked to the Turkish Water Pollution Control Regulation has been issued in 1991 to stipulate irrigation water standards for reuse of waters in agriculture [2]. The Turkish bulletin, is fairly advanced by the current concepts, however lacks technology based stipulations and is unrealistically stringent in terms of microbiological criteria, as seen in Table 4. Considering the economics of reuse in agricultural irrigations the current standard needs to be updated in the light of the current scientific evidence. The microbiological quality standards in the world are seen to differ significantly between countries. The Title 22, adopted by the green belt states of the USA, represents the strictest and technology based standard. While the WHO standard, represents somewhat the pragmatic approach. Where <1000 FC/100 ml is purely adopted from swimming water standards and <2 NTU is based on the assumption that with a turbidity at or below 2 NTU the likelihood of getting helminthic eggs through reused water in irrigation will be tolerably low. The newest standards are those adopted by Australia, Tasmania, Japan which are allegedly based upon the recent scientific evidence and the 100-200 FC or E. Coli /100 ml is adopted for freshwaters. The Israeli reuse standard adopted from Title 22 is presented in Table 5 [4].



Attainable reuse water standards should clearly take into account the local conditions while reasonably safeguarding the population. An attempt to establish a unified guideline for the Mediterranean countries, based upon risk assessment, using epidemiological data and model studies, has been established as proposed by Blumenthal *et. al.* (2000) [3] and tabulated in Table 6. Three microbiological quality criteria are proposed in the guideline, namely, nematode eggs, FC or *E. coli* and suspended solids (SS), along with the technology requirements. In cases where there is evidence that microbiological criteria are met SS criteria may be overlooked. This has important implication in that the low cost lagoon technology, which is extremely suitable for the MED countries, may produce effluents which can meet the microbiological standards but produce turbid effluents. Comparing with the Turkish standard the main difference is that Turkish standard does not specify a minimum technology requirement for different water classes nor does it consider helminth eggs, in the reuse water.

| | Irrigation Water Class | | | | |
|-------------------------------|------------------------------|------------------------|----------------------------------|--|-------------------------------------|
| Quality Criteria | Class I (very good) | Class II (good) | Class III (usable) | Class IV (usable with caution) | Class V detrimental unusable) |
| Boron, mg/l | 0–0.5 | 0.5– 1.12 | 1.12–2 | >2 | |
| Irrigation Water Class | C1S1 | C1S2. C2S2. C2S1 | C1S3.C2S3. C3S3.C3S2. C3S1 | C1S4.C2S4. C3S4.C4S4. C4S3.C4S2. C4S1 | |
| NO3- or NH4+, mg/l | 0–5 | 5–10 | 10–30 | 30–50 | >50 |
| Fecal Coliforms, /100ml | 0–2 | 2–20 | 20–100 | 100–1000 | >1000 |
| BOD5, mg/l | 0–25 | 25–50 | 50–100 | 100–200 | >200 |
| Suspended Solids, mg/l | 20 | 30 | 45 | 60 | >100 |
| pH | 6.6– 8.5 | 6.5– 8.5 | 6.5–8.5 | 6.5–9 | <6 or >9 |
| Temperature | 30 | 30 | 35 | 40 | >40 |

| Table 4. Summary of some of the | most cruci | ial parameters | for reuse | in |
|---------------------------------|------------|----------------|-----------|----|
| Technical Aspects Bulletin | n. [2] | | | |



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

| Parameters | | Group of cro | ps/main crops | |
|--|--|---|---|--|
| | A Cotton, sugar beet, cereals, dry fodder seeds, forest irrigation, etc. | B Green fodder, olives, peanuts, citrus, bananas, almonds, nuts, etc. | C Deciduous fruits ^b conserved vegetables, cooked and peeled vegetables, green belts, football fields and golf courses | D Unrestricted crops, including vegetables eaten uncooked (raw), parks and lawns |
| Effluent quality BOD ₅ total (mg/l) BOD ₅ dissolved (mg/l) Suspended solids (mg/l) Dissolved oxygen (mg/l) Coliforms counts (/100 ml) | 60 ^a - 0.5 - | 45 ^a - 0.5 - | 35 20 30 0.5 250 | 15 10 15 0.5 12 (80%) |
| Resid. avail. chlorine (mg/l) | Ι | | 0.15 | 0.5 |
| Mandatory treatment Sand filtration or equivalent Chlorination (minimum contact time, min) | I I | | - 09 | required 120 |
| <i>Distances</i> From residential areas (m) From paved road (m) | 300 30 | 250 25 | 1 1 | 1 1 |
| ^a Different standards will be se picking; no fruit should be picl | t for stabilization ponds wi ked from the ground. | th retention time of at lea | st 15 days. ^b Irrigation must | stop 2 weeks before fruit |

Table 5. Israeli Wastewater Reuse Standard [4]



Table 6. Guidelines developed for MED countries for wastewater reuse in irrigation by Blumenthal et.al. (2000)[3]

| | Qua | lity criteria | | |
|--|--|---|----------------------------|--|
| Water category | Microbiological | | Physical- chemical | Wastewater treatment expected to meet the |
| | Intestinal nematode ^(a) (no. eggs per liter) | FC or <i>E. coli</i> ^(b) (cfu/100 mL) | 88 (°) (mg/L) | criteria |
| Category 1 | | , | | |
| a) Residential reuse b) Urban reuse c) Landscape and recreational impoundments (contact is allowed) | $\leq 0.1^{(h)}$ | ≤ 2 00 ^(d) | ≤10 | Secondary treatment + filtration + disinfection |
| Category II | | | | |
| a) Irrigation of vegetables b) Landscape impoundments (contact is not allowed) | $\leq 0.1^{(h)}$ | | | Secondary treatment or equivalent ^(g) – filtration + disinfection |
| c) Industrial reuse (except for food industry). | - | ≤ 1000 ^{øl;} | ≤ 20 ≤ 150 ^ø | or Secondary treatment or equivalent ⁽²⁰ + either storage or well-designed series of maturation ponds or infiltration percolation |
| Category III | | | | |
| Irrigation of cereals and oleaginous seeds, fiber, & seed crops, dry fodder, green fodder without direct grazing, crops for canning industry, industrial crops, fruit trees (except sprinkler-irrigated) ^(t) , plant nurseries, ornamental nurseries, wooden areas, green areas with no access to the public. | ≤ 1 | None required | ≤ 35 ≤ 150 ^m | Secondary treatment or equivalent ^(g) + a few days storage or Oxidation pond systems |



Cost of Irrigation versus Product Costs

From Table 3 it can be seen that cost of secondary treating of 1 m³ of wastewater is variable between 5-15 \in cents. Extra cost of coagulation/flocculation and filtration is 5 \in cents /m³ (Israeli data, personal communication) on top of secondary treatment. In case ultra filtration is to be practiced this is additional 15 \in cents (Israeli data). Therefore total cost of treatment for irrigation quality of reuse wastewater is 10 – 30 \in cents/m³. In MBR technology, our experience is that the energy cost is around 13 \in cents/m³ and 45 \in cents/m³ when membrane depreciation is considered.

Conversely assuming that single crop of corn or wheat requires 500 mm of water, and that 2 tons of corn or wheat produced per hectare, and selling price of one ton of corn or wheat is 267 US \$ then:

 $(267 \$ 2 \text{ tons}) / 5000 \text{ m}3 / \text{ton} = 0.107 \$ \text{ or } 10.7 \$ \text{ cents/m}^3 \text{ is the revenue gained per m}^3 \text{ of water used. Clearly cost of treating domestic effluents to the irrigation water quality far exceeds the revenue to be made from each m³ of water in irrigation. However lagoon technology, which is being abandoned in the world owing to its turbid effluents, produces treated effluents almost at no cost. This technology may be revived should an easy-to-use biochemical monitoring technique be developed for identifying and enumerating protozoa and helminthes in the effluents.$

Conclusion

The following conclusions may be drawn:

- Water scarcity is already a serious problem in MED countries. Those MED countries, including Turkey, which are at present considered reasonably water sufficient may quickly become water deficient in the near future with their high rates of population growth, increased industrial throughput, increased pollution of water resources. Groundwater table has already seriously dropped in some of the regions due to excessive abstraction of water.
- Pumping water for irrigation from distances may often become prohibitive in cost. Reuse of already pumped wastewaters in irrigation may be a solution for sustainable development and for sustainable environment, provided that cost of tertiary treatment is substantially reduced for the farmers.
- At present it is ethically conceived that cost of secondary treatment be borne by the polluters, eg. citizens. However secondary treatment is by no means complete and discharged effluents contain 6-7 logs of coliform organisms. This ethical logic was developed by the water rich Northern countries who do not need to reuse effluents for crop irrigation. The idea was also adopted by the MED countries without due consideration. In the light of sustainability it is mandatory that tertiary treatment be also financed by the consumer and that treated wastewaters be pristine in quality and be available to the farmers at minimal costs. Only by this way sustainable growth and environment may be attained in the MED countries.
- The stringent reuse standards practiced in MED countries may somewhat be relaxed in the light of the present scientific evidence. This will bring back the use of cost effective lagoon technologies in which turbid effluents may be used in irrigation



almost at no cost. The technology may be revived if an easy-to-use biochemical monitoring technique be developed for identifying and enumerating protozoa and helminthes in the effluents.

- Reuse of wastewaters in agricultural irrigation should initially provide extra 1 billion m³ of water per year in Turkey. This may approach to 6 billion m³ in years to come.
- At present 35% of the total population in Turkey is being served by urban wastewater treatment plants. Remaining 65 % of population is located in small settlements, villages and towns, who mainly indulge in agriculture. Therefore it is clear that great numbers of small scale, cost effective decentralized treatment plants, whose effluents are suitable for irrigation, will be necessary for sustainable growth and environment.

REFERENCES:

[1]http://www.uest.gr/medaware/progress.htm

- [2]WPCR Technical Bulletin, 1991. Turkish Water Pollution Control Regulation Technical Bulletin Dated January 7, 1991, Reference Number 20748.
- [3] Blumenthal, U. J., Mara, D. D., Peasey, A., Ruiz-Palacios, G. and Scott, R., 2000. Guidelines for the microbiological quality of treated wastewater used in agriculture: recommendations for revising WHO guidelines. Bulletin of the WHO Vol.78 (9), pp.1104-1116.
- [4] Angelakis A.N., Marecos Do Monte M. H. F., Bontoux L., and Asano T., 1999. "Review Paper, The status of wastewater reuse in the Mediterranean Basin: Need for guidelines", Wat. Res. Vol. 33, (10), pp. 2201-2217.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



CONSUMERS' ATTITUDES ABOUT ENVIRONMENTAL SENSIVITY

Cengiz YILMAZ, Tuncer ÖZDİL, Beran GÜLÇİÇEK, İdil ALTIPARMAKOĞULLARI

Celal Bayar University, Manisa, TURKEY yilmazce@hotmail.com,tozdil12@hotmail.com,beran.gulcicek@bayar.edu.tr, idil.altiparmakogullari@bayar.edu.tr

Countries should keep up a new formation shaped by the globalization process and by the effects of globalization concept. It can be said that countries survive in a rocky road to achieve developed countries level related to economical, political, social and technological changes. They compete under national and international factors in economical area within a period called "information age" arisen as a result of technological improvement. Environmental activities are one of the important factors as a characteristics of "information age". The effect of the environmental formations on all organizational functions as production, marketing and logistics etc. is apparent. Now companies must continue to their activities by taking environmental responsibility into account. Because in parallel with development degree, environmental consciousness grow up and consumers' needs and requirements change to this effect. In this context, concept of "green economy" is raised to discourage economic waste as well as to prevent environmental damage. In this study individual environmental sensitivity will be examined in contemplation of people are corner stones of the concept of "green economy" and the environmental responsibility. Aim is to observe whether there is a change in individual perception about environment and solid waste based on an research studied in 1998. Also environmental damage caused by solid waste will be studied and economic benefits gained by recycling of solid waste will be noticed.

Keywords: Environmental pollution, solid waste, green economy, information technologies

INTRODUCTION

"Nuclear Technologies will bring world to an end, people who achive to survive will start the civilization race from Stone Age"

Albert Einstein

Humanity history is the sum of efforts oriented to meet wants and requirements. In this process, "development" concept which is aimed to be reached by every community, has been acquiring different expressions from time to time. By Adam Smith "Development level" has been proposed as needs of communities and evaluated by production rate (Dura, 1985: 39). After the industrial revolution, main purpose has arisen as meeting endless needs by insufficient resources. Warfare against scarcity is at the heart of economic activities. In recent years, humankind who use natural resources for its needs, has started to think about the future of the world. Radical changes in nature have begun to be discussed in the domain of science. It was started that environmental issues to be drawn attention within academicians in 1932 (Fisunoglu, 1985: 61).



After World War II, environmental concepts sticked out as a result of economic growth rate, new industries, urbanization, etc. Studies have picked up speed after the Western-World understood the seriousness of matter. Common point of all studies is to focus on life quality as it get out from production – for – consumption approach.

In new formation which makes a promise of qualified life standards, driving force is globalization fact. Globalization movements have influence on environmental issues. This formation process in which boundaries disappeared, all kinds of information shared is called "Information Age". The most important feature of information age is to be observed a structure that consumers' wants and requirement become global and production processes disperse to different geographies. It is expected from countries and firms in these countries to be sensitive about society's future.

This sensitivity which is explained by "social responsibility" concept expands scope of economic activities. Qualified environment need as a subset of life quality has become a constraint of an economic activity. Qualified environment need is like another kind of need but the only difference is its satisfaction level that is compared with total life.

ENVIRONMENT AND ENVIRONMENTAL ISSUES

In a limited sense, environment is thought as a sum of natural conditions. But furthermore environment contains social conditions, too. So it is the whole of physical, chemical, biological and social factors that influence living creatures directly or indirectly.

Environmental issues are defined as a problem arisen from effects of artificial environment produced by human being on natural environment, unhealthy conditions of this artificial environment, waste of natural resources and environmental damage. Assumption about limitless natural resources is the main factor that triggers environmental problems. People's interest is derived from damage of social environment as a result of these problems. History of economy shows that environmental problems have act together with growth in production and consumption strength. As the main purpose is to increase production, it is required that production inputs should be supplied as an intense and continuous manner but as the side effects of the process are not to be taken into consideration, natural resources have been consumed rapidly. Consumption which is the focal point of production, matures parallel to features and structure of production. Environmental issues grow up more and more because of dismissing the qualified environment need in production consumption relationship. A healthy environment is the major want of consumers today and also it is the main caution of imbalance in nature and they defend to do required arrangements as its effects increase globally.



Population growth, prosperity and progress problems, industrialization, economic growth and lack of control in economic growth are main topics come into mind when environmental problem is said. Actually source of the problem grow out of gaining all of these factors a status of difficulty set as getting out of correspondence between cause and effect. Environmental issues can be grouped such as:

- People-Oriented Issues: It is thought that main reason behind environmental insensitivity is lack of information. Such an illiteracy in information age caused by deliberate orientation of companies in accordance with their benefit. Under changing conditions, requirement of social responsibility will cause firms to gain auto control property. Not to come to an impasse fundamentally, people must be educated about and made conscious of environment. So they can notice their responsibility about environment as a consumer. In any case, an environmental effort will not be successful without civil support.
- Economy-Oriented Issues: Determining societies of 20th century moved in production-consumption process with assumption of holding nature in hand and set policies according to this assumption. In production system, environmental problems occur in input supply process first. Abolition of productive agricultural territories together with industrialization is the most striking example of this. Second negative effect of production process arises in output phase. Pollution can be caused by "production waste" as well as by-products. Waste production increases parallel production and consumption structure. Consumption activities which digress from fundamental needs and tend to luxury goods cause extravagance of resources. Second dimension of consumption about environmental issues is its general structure of being done "as a group". People consume natural resources as a group, but don't give anything response.

Population growth in the world, is another reason of environmental problems. As the population increases, demand pressure on natural resources will increase, too. Requirement to provide prosperity with nutrition is the main factor causes to conflict. Population growth brings urbanization problem along with itself. As a result of unplanned and uncontrolled urbanization activities, productive territories damaged and air, water pollution occurs.

Solutions for environmental issues are seemed as an economic burden and it is assumed that they cause increases in costs and prices (Bilge et all, 1985: 21). The most realistic way to control pollution in market economies is to include it into price system. Environmental protection investments are grouped in two:

- Waste Disposal: Recycling wastes provide to decrease production costs and avoid loss of resources. In addition to recycling activities, usage of production technologies that reduce waste production must be applied. These types of technology provide to convert wastes into by-products.
- Conversion of Classical Energy Methods: Energy trouble is the biggest barrier in front of environmental formations. Most of social necessities cause to consume more and more energy than needed. Poor energy resources force countries to find new methods and sources. The importance of the matter is to design systems sensitive to environment.



Investments grouped as above permit to search new Technologies concurrently with raw material and energy savings. Also new employment areas will arise after recycling activities (Vig and Craft, 1990, 354). As environmental markets improve, it is supposed that costs will decrease. Furthermore it force firms to work rational, as now materials reprocessed, new energy systems provide energy savings used, in the long run it reverse cost and price increases.

POLLUTION TYPES

- Nuclear Pollution: Nuclear pollution is important about plants in land and other natural beings. Nuclear power stations, nuclear experiments brings radioactive effects with it. Radiation effect causes mutation. Environmental groups came out against nuclear technologies and defend that it was the last chance as an energy source. Cost of nuclear plants and negative results make countries think. First of all, nuclear waste remain in nature or thousands of years and it's so hard to save it harmless in nature. Today in USA, harness discussions are experienced about nuclear wastes. Environmentalists defend to use endless resources like wind, sun, etc. instead of nuclear energy as it called the cheapest energy source. Another feature of nuclear energy is to cause other environmental pollutions as oil, water, air pollution.
- Air Pollution: Air is a fundamental necessity for life. It is a composition of % 78 of hydrogen, %21 of oxygen and % 0,1 of other gas like carbon dioxide, argon. Air pollution can be turned up because of natural reasons like volcanic movements, forest fire or it is a result of pollutants from production processes, vehicles, chemical activities, etc. Air pollution is more in cities especially, as a result of urbanization.
- Water Pollution: Water is vital source for life like air and it is used for different reasons like irrigation, drinking, production, etc. Water pollution can be defined as disruption in water in terms of mineral, flavor, clearness, etc. It is derived from agricultural or industrial activities. Chemicals emerging from industrial wastes have killing effects from time to time. Oil wastes, nuclear wastes are other factors of water pollution. Treatment plants for sewer and industrial wastes should be used. Consequently when work places are being planned, they should be thought with treatment plants and related control mechanisms should be developed.
- Street Pollution: It is an environmental issue resulted from population growth and unplanned urbanization activities. It can be defined as convension of living spaces into an unhealthy structure by people consciously or unconsciously. Street pollution cause view pollution as well as health problems. For protection environmental education is beneficial.
- Solid Waste: Solid waste is perceived as garbage. Domestic solid waste contains % 68 of organic wastes and overall is items like paper, carton, textile, plastic, leather, metal, wood, glass and ash (www.cevreveorman.gov.tr, 2006). For Turkey economic value of domestic solid waste is nearly 40 million YTL, with industrial waste it reaches to 80 million YTL (Yilmaz and Ozdil, 1999: 51). It is an important environmental issues to collect, stock and abate of solid waste. Unstocked garbage causes water pollution, panging, view pollution and spread of diseases. It is needed to



bring solid wastes down in its source. It is necessary to converte wastes into other products and energy by utilizing from their specific characteristics. Recycling provide advantage for future by resource and energy savings. In recent years, actions about separation of wastes grow up in Turkey. For example, Manisa Municipality works on separation in order to create resource nowadays.

- Noise Pollution: Noise pollution is evaluated as environmental issues because it has a structure that effects perception of environmental values. Noise can be defined as disturbed voice. Noise sources violate individual and social life common in cities. Well-known noise sources are technological devices, transportation vehicles, suprastructures. Harms of noise pollution in health are not less important than harms of other type of pollution. For instance it is known that it cause to cardiovascular diseases.
- Traffic Density: Consistent population in cities causes many problems. Traffic confusion in city centers, especially before and after work hours, is a dimension of traffic issue. Also in intercity highway, a traffic density is added to this because of physical conditions, lack of control and lack of education. It is known that traffic cause noise pollution and air pollution with exhaust gas. But also it is a reason of stress in daily life. Stress makes people unhealthy. Solution for traffic density is bulk transportation. Bulk transportation vehicles (subway, train way, bus etc) should be generalized, and highway, sea route and railway transportation should be balanced.

GREEN ECONOMY

Green economy is a concept used for economies focused on meeting requirements of people and environment. It is humble to eco-systems and show interest in all of environment –related systems not only interested in environment. Green economy focuses on to create positive alternatives for every sector in economy and for cross-sections of life (Milani, 2005).

If it is considered that natural resources will end because of uncareful usage, companies should make an effort in order to prevent wastage of resources. Economies which recognize the importance of topics like protection of natural resources, energy saving, reduction in waste quantity, in order to leave a healthy environment for coming generation, search and improve new methods about recycling. In closed-circuit production system of green economies, every output turns back to ecosystem as a commodity or a fertilizer, or becomes an input for another production process (Lovins et all, 2002: 15).

Also, it is not possible for a firm which aims to improve customer satisfaction, to be unsensitive about environmental issues. Firms should show sensitivity in production processes as well as producing environmentally sensitive products.

Expectations of society from organizational management about social responsibility are classified like this:

- To emphasize using recoverable items instead of using or producing item contrary to nature,
- To avoid, reduce or recycle packages harmful for environment,



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

- To find happy medium points in technology-environment synergy,
- To be congruent with nature in new product development or product differentiation operations,
- To put down activities those are harmful for nature.
- To support R&D departments through environmentalism as a requirement of modern management approach.

Companies should make production by using resources efficiently and should have an active role in society by allocating some resources for social problems. They should obey the rules called "Valdez Principles" in order to focus on social responsibility and environmental issues. Valdez Principles are defined as (Uydacı, 2002: 53):

- To remove items cause to pollution, to minimize quantity of harmful wastes,
- To market products and services safe about environment,
- To get ready for accidents and to reconstruct suffered peripheries,
- To provide safety for employees who report environmental damage,
- To assign an executive responsible for environmental activities and to improve control of global operations.

Damage of life circle will rise, if companies don't carry out responsibility. Besides the damage of investments and wastes in nature, leakages from production processes have unfavorable effect on environment. So firms should subsidize environmental protection activities in order to prevent pressure of production on nature.

As it said before, cautions about environmental problems cause increase in costs and prices. But if it is mused, this cautions provide important returns like energy and resource savings, customer satisfaction, increase in demand and new energy technologies and return on investment will be greater in the long-run.

GREEN CONSUMERS

As environmental issues threaten natural life, domain of topic broadens day to day. Public body should participate in solutions and should support environmental movements. Public participation is seen as a crucial starting point as it isn't a whole solution in fact.

People are not sensitive about events that are not directly related with them, when they are not be made conscious of problems appear as a result of human behavior. Improving environmental conscious provides to live in a safe and healthy nature and it is possible just with environmental education. Consumers with this conscious will struggle about their local area not to be polluted and also they will counter to harmful activities globally.

Consumers demand required products with optimal quality and technological advantage and now they want firms to make efforts about environmental issues. Firms should plan their activities and strategize in this way as they move according to customers' behaviors and wants.



According to researches, it is seen that consumer' environmental conscious level has risen. Consumers who perform to reduce damage on world are called as "Green Consumers". Green consumer is defined as a person who abstain from buying some goods (goods that threaten life of people; goods that consume so much resources; products whose production or wastes are harmful for nature; products that cause redundant waste because of packaging, additional features or short life-span; products related with painful applications about animals; products which effect other countries negatively, etc.)(Ozata, 2006). Companies have tried to improve goods and services for this type of consumers.

All of cautions with an aim of environmental protection is convicted to be ineffectual as consumers don't have a conscious. Consumers who are aware of environmental problems demand products with minimum harm. Green consumer acts natural and positive about world, nature and people. Environmental performance differs between green consumers. As a result, environmental consumption is classified as (Uydacı, 2002: 100):

- People support green movement. They give an active support to environmental organizations or they are a member of these organizations.
- People who think green. They campaign green movements and they look for green products as informed.
- Generally anxious people. They are anxious about environment, no matter if there is something done.

Consumers, who are classified as above, are interested in consumption of scarce resources, recycling of production wastes as well as purchase attitudes. Green consumer should take pains over not to purchase products with excessive packaging. Usage of packages that have negative effect an nature cause to pollution. Limited items which are chucked out without any idea, are recycled and most of them turn to nature. They penetrate into soil and foods.

As it studied before, demographic features of green consumers is important about environmental conscious. Attributes like age, gender, education and income level effect consumers' point of view about environmental conscious. According to the researches studied before, younger people are more sensitive about environmental issues. In conjunction with determining as women are more sensitive than men, there is no distinct difference between them. If it is considered that education is required in order to make people conscious of environment, to provide usage of nature without any damage, it is expected that education has a positive relation with environmental behaviors (http:// cevre.nilufer.bel.tr / page.asp?id=8).

It is supposed that as the income level increases, demand of green products will increase simultaneously. Most of green marketing strategies rely on idea of paying more to green products. Consumers who make an effort individually about environment are defined as people who "are conscious about their role in environmental movements, are hospitable to new ideas and sensitive about individual safety in relationships with nature" (Uydacı, 2002: 100). In addition to consumers, governments and civil organizations have a responsibility about environmental problems. People who think that individual efforts have little effect on problems, should not forget that by the time effect will be more than now.



DETERMINATION OF CONSUMERS' ENVIRONMENTAL SENSIVITY

A survey is prepared in order to determine individual environmental sensitivity. Sample consists of 300 people. % 52,3 of participants is men and % 47,7 is women. %42 of participants is 16-20 years old, % 43,7 of them are 21-24 years old and rest of them (% 14,3) is 25 and high. Majority of sample (% 85,7) is composed of 16-24 year old teenagers. Respondents are at different level of education from primary school to university. But university students have the major portion by % 77,3. High school and university graduates follow them by % 9 and % 8 rate. % 78 of participants state city centre as place longest lived in, % 18 of them live in townships. Approximately % 70 of sample indicate living in places with more than 500000 population, places with 100000–500000 population follow it by %20 rate. % 60 of participants have 500-1500 YTL income, % 35 of them have 1500-2000 YTL.

VIEW OF ENVIRONMENTAL ISSUES

In the questionnaire, pollution types are classified in order to determine what they understand about environmental issues. It is required from participants to give points to these issues between 1 and 5 as 1: Unimportant 5: Very important. Table 1 represents means of points:

| Pollution Types | Mean | Standard Deviation |
|-------------------|------|--------------------|
| Nuclear Pollution | 4,58 | 0,88 |
| Air Pollution | 4,58 | 0,63 |
| Water Pollution | 4,47 | 0,75 |
| Street Pollution | 3,84 | 0,95 |
| Solid Waste | 3,85 | 1,03 |
| Noise Pollution | 3,29 | 1,16 |
| Traffic Density | 3,46 | 1,12 |

Table1. Importance of Environmental Issues

As seen above, pollution types that are perceived as environmental problem with highest mean value are nuclear pollution, air pollution and water pollution. Lowest mean value belongs to noise pollution but other of them have a value over 3,5. So it can be said that respondents give importance to environmental issues. Results are same with results of similar study made in 1995 and 1998. List of pollution types have not change. Comparative results are seen in Table 2.



| | 1995* | 1998* | 2006 |
|--|----------|--------|------------|
| 1- Number of People | 171 | 236 | 300 |
| 2- Number of People less then 25 years old | %87 | %93,2 | %85,7 |
| 3- Gender | Man: %40 | Man: | Man: %52,3 |
| | | %54,2 | |
| | Woman: | Woman: | Woman: |
| | %60 | %45,8 | %47,7 |
| 4-Who Live in Cities | %70 | %73,3 | %78,7 |
| 5-Who live in placed with population more | %50 | %66,9 | %69,3 |
| than 500.000 | | | |
| 6-Mean of Nuclear Pollution | 4,15 | 4,37 | 4,58 |
| 7-Mean of Air Pollution | 4,32 | 4,65 | 4,58 |
| 8-Mean of Water Pollution | 4,05 | 4,33 | 4,47 |
| 9-Mean of Solid Waste | 3,41 | 3,88 | 3,85 |
| 10- Rate of 4-5 Waste Points in Solid | %51 | %66,1 | %66 |

Table 2: Comparative Results (1995-1998-2006)

*Resource: Yilmaz, Ozdil, "Economic Value of Solid Waste", Environment and Human Magazine, Number 43, March-1999, pp:52.

As it seen above, participants are different individuals but have similar characteristics. In the period, nuclear pollution mean has increased from 4,15 to 4,58, and water pollution mean has risen from 4,05 to 4,47. Means of air pollution and solid wastes have decreased in 2006 according to 1999 but it is higher than mean 1995. 4-5 points in solid waste have stayed same relative to 1999 but according to 1995 it have risen from %51 to %66,1. So environmental problems have become more important in the 10 year period.

HOW IS SOLID WASTE PERCEIVED?

To determine what the solid waste concept is reminiscent of, it is asked to give points as importance rate to the expressions in the survey. Mean Values are seen in Table 3.

| Expressions about solid waste concept | Mean | Standard |
|--|------|-----------|
| | | Deviation |
| 1- If they are picked up, there is no pollution. | 4,08 | 1,06 |
| 2- They pollute at all events. | 3,24 | 1,30 |
| 3- They should be used by separated at source. | 4,35 | 0,98 |
| 4- Population growth and distorted urbanization should | 3,65 | 1,34 |
| be prevented in order to stop environmental pollution. | | |

Table3. Means of Opinions about Solid Waste

Participants want to recycle refuse and think that if they are picked up, there is no pollution. Also they don't agree with expression of solid wastes pollute at all events.



EFFECT OF POPULATION ON SOLID WASTE IMPORTANCE

There is a significant relationship between population and importance of solid waste at 0,09 level of significance. Relation is seen in Table 4.

| Population | l | Importance Giving to Solid Waste | | |
|------------|------|----------------------------------|--------------|-------|
| | | 1- Unimportant | 2- Important | Total |
| Less | than | 2 (0,06) | 32 (0,94) | 34 |
| 100.000 | | | | |
| 100.001- | | 2 (0,04) | 56 (0,96) | 58 |
| 500.000 | | | | |
| High | than | 3 (0,02) | 205 (0,98) | 208 |
| 500.000 | | | | |
| Total | | 7 (0,02) | 293 (0,98) | 300 |

 Table 4. Relationship between Population and Opinions about Solid Waste

Relationship between population and solid waste is examined and rates of participants who give importance to solid waste relative to population sections are %94, %96, %98. Differences are not significant statistically but we can say that solid waste is seen important in all regions. But especially places with more than 500.000 population level it is seen more important with a % 98 portion. Generally it is supposed that as population grows importance giving to solid waste increases.

RELATION OF SOLID WASTE AND STREET POLLUTION

In conjunction with damage in reliability cells with zero and less than 5 frequencies in chisquare analysis, a significant relationship between solid waste and street pollution at less than 0,0001 significance level.

| Importance | Importance Giving to Solid Waste | | | | | |
|--------------|----------------------------------|-----------|----------|------------|-----------|-------|
| Giving to | 1 | 2 | 3 | 4 | 5 | |
| Street | Unimportant | Less | Importan | Relatively | Very | Total |
| Pollution | | Important | t | Important | Important | |
| 1- | | 2 | 1 | 1 | | 4 |
| Unimportant | | | | | | |
| 2- Less | 3 | 7 | 4 | 3 | 2 | 19 |
| Important | | | | | | |
| 3- Important | 1 | 8 | 30 | 27 | 11 | 77 |
| 4-Relatively | 1 | 2 | 25 | 56 | 36 | 120 |
| Important | | | | | | |
| 5-Very | 2 | 1 | 15 | 19 | 43 | 80 |
| Important | | | | | | |
| Total | 7 | 20 | 75 | 106 | 92 | 300 |

 Table 5. Importance Relationship Between Solid Waste and Street Pollution



There is nobody with idea of unimportance of both factors. Rate of respondents who say less important is low [%2,3(7/300)]. Rate of respondents who say relatively important and very important is nearly %51,3. These rates was %21,05 in 1995, and % 46,1 in 1999 (Yilmaz, Ozdil, 1999: 54). It is satisfactory as sensitivity of two factors has increased in 2006. And %78 of participants who give 4-5 points to solid waste consider street pollution, too (154/198).

RELATIONSHIP BETWEEN SOLID WASTE IMPORTANCE AND USAGE OF SOLID WASTE AS RAW MATERIAL

Cells with 0 and less than 5 frequencies cause to similar problems here. A significant relationship between solid waste importance and usage of solid wastes as raw material is found at 0,001 significance level. Relationship is seen at table 6.

| Usage of Solid | Solid waste Importance | | | | | |
|----------------|------------------------|-----------|----------|------------|-----------|-------|
| Wastes as | 1 | 2 | 3 | 4 | 5 | |
| Raw Material | Unimportan | Less | Importan | Relatively | More | Total |
| | t | Important | t | Important | Important | |
| 1- | | | 2 | | 1 | 3 |
| Unimportant | | | | | | |
| 2-Less | 1 | 3 | 6 | 5 | 2 | 17 |
| Important | | | | | | |
| 3- Important | | 3 | 17 | 13 | 5 | 38 |
| 4-Relatively | 1 | 7 | 17 | 17 | 12 | 54 |
| Important | | | | | | |
| 5-More | 5 | 7 | 33 | 71 | 72 | 188 |
| Important | | | | | | |
| Total | 7 | 20 | 75 | 106 | 92 | 300 |

Table 6. Relationship Between Solid Waste Importance And Usage Of Solid Waste As Raw Material

Nobody say unimportant about two factors and rate of less important is very low. % 66 (198/300) of respondents consider solid wastes as a problem and %86 (172/198) of these respondents realize usage of solid wastes as raw material as very important. This concept has the highest mean (4,35) in statements about solid waste.



CONCEPTION ABOUT ENVIRONMENTAL SENSITIVITY OF CONSUMERS

It is asked from participants to score statements as a customer in order to define environmental sensitivity. Means of score are seen in Table 7.

| Statements About Environment | | Standard Deviation |
|---|------|-----------------------|
| It is important to make a contribution in environmental protection as a consumer | 4,36 | 0,94 |
| Products of environmentally sensitive firms should be preferred. | 3.77 | 1.12 |
| It is important to pay attention to "recoverable package" symbol on products. | 3,70 | 1,14 |
| There is no effect of individual efforts on environmental protection. | 2,72 | 1,57 |
| It is important to pay attention to a product about its harm for nature even if a price differentiation exists. | 3,44 | 1,14 |
| It is important to be found "member of CEVKO Foundation" on product. | 3,21 | 1,15 |
| Public administration should set effective policies about environment. | 4,28 | 0,93 |
| Civil organizations should contribute policies about environment and effort to improve environmental sensitivity. | 4,21 | 0,96 |
| All organizations should work together in order to protect environment | 4,21 | 1,01 |
| Organizations should be quieted and should be fined in required situations. | 4,34 | 0,98 |
| Environmental protection controls should be made by public administration. | 3,61 | 1,11 |
| Social control mechanism should be transformed. | 4,06 | 0,97 |
| Individuals should have environmental culture. | 4,62 | 0,71 |
| All applications which are harmful for nature should be ended without considering their economic value. | 3,73 | 1,26 |
| Nature can be sacrificed for industrialization. | 2,36 | 1,53 |
| Industrial establishments should take preventive action in order to provide environmental protection. | 4,57 | 0,77 |
| Companies should make effort in order to improve environmental sensitivity as requirement of social responsibility. | 4,21 | 0,88 |

Table 7. Opinions of Consumers' about Environmental Issue

As seen in Table 7, mean values change between 2,36 and 4,62. Respondents consider environmental culture most important. They want firms to take preventive actions and then work to improve environmental sensitivity. Also public control and social control mechanisms are come into as a general view. In addition to this, they believe in positive effect of individual efforts. Minimum means show that they don't join statement of sacrification of nature for industrialization and they don't support conception that individual efforts are ineffective.



CONCLUSION

Major scientific and technologic developments in recent years provide wealth to countries and comfort to people. But in this period an environmental disaster with air pollution, nuclear pollution, ecologic pollution is faced with because of urbanization population growth, industrialization.

Nature was seen an endless resource in the past but now it is received as a scarce resources and it should be used efficiently. And importance of environmental issues has risen day to day.

Developed countries have recognized the matter of fact and have begun to design production systems environmental harmless as they can not abandon from industrialization.

Environmental protection is possible by a culture and sensitivity. Environment will be discussed in a long time as a major problem in front of the world. So it is important to emphasize importance and periodical differences. In this study, we tried to determine people's point of view about environmental issues and most of them consist of university students. As a result, nuclear pollution is found as the most important problem possible to effect our future. Additionally it is seen that every body has a responsibility on nature.

REFERANCES:

Bilge R.; Dura C.; Fisunoglu M.; Garipoglu Z.; Uslu O. Cevre ve Ekonomi, Onder Press, Ankara, 1985.

Dura C. Cevresel Problemler ve Ekonomi, Cevre ve Ekonomi, Onder Press, Ankara, 1985. Fisunoglu H.M. Cevresel Problemler ve Ekonomi, Onder Press, Ankara, 1985.

Lovins A.; Lovins H.; Paul H. Is ve Cevre, Harvard Business Review , BZD Press, Istanbul, 2001.

Milani B. What is Green Economics?, 2005, http://www.greens.org/s-r/37/37-09.html. Ozata Z. Yesil Ekonomi, Istanbul, 2006.

Simsek, M. S.; Çelik A. Ekolojik Yapı ve Firmaların Sosyal Sorumlulukları, Cevre ve Insan Dergisi, Year 6, Number 20 (April 1995), pp.30-33.

Uydacı M. Yesil Pazarlama, 2002, Turkmen Bookstore, Istanbul. Vig N. J. ; Kraft M.E. Environment Policy in the 1990s, Congressional Quarterly Inc., 1990.

Yılmaz C.; Ozdil T. Katı Atıkların Ekonomik Değeri, Cevre ve Insan Dergisi, Gokce Press, 1999, sayı 43, pp 51.

http:// cevre.nilufer.bel.tr, 11.10.2006. www.cevreeorman.gov.tr, 13.10.2006. http:// zeynepozata.wordpress.com, 10.05.2006



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



THE ESTABLISHMENT OF RURAL PRODUCTIVE UNITS

Juan GUZMÁN*, Martín CERVANTES**, Adrián MENDOZA**.

*Universidad Autónoma de Baja California Sur, México. ** Agropónica Los Planes, Baja California Sur, México. jguzman@uabcs.mx

The introduction of exotic species of livestock to México, mainly from Europe, during colonial times produced a drastic change in many ecosystems, also in the rural economy and lifestyle of the communities. In Baja California Sur, state located in the southern half of the peninsula of Baja California, in NW Mexico, were introduced Spanish varieties of cattle, goats and horses, thus, establishing a ranching tradition and generating what is presently known as "criollo" varieties of livestock. The environmental degradation and desertification that brought this practice is causing an abandonment of agricultural practices, emigration to urban areas and increment of poverty. This project is inspired in Agenda21, which propose the integrated management as a tool to reach sustainable development. An integrated management model takes many years to develop and without a serious support from the governments, it is unrealistic to hope that will be established in the near future. The project, intends to establish an experimental productive unit that after a trial period can be replicated in the community, thus offering new opportunities to rural families and a reconsideration of land value. Our thesis is that if we develop productive units that can be established and managed at the family level, as private enterprises; they could be incorporated at the community level, for the processing and marketing. The unit proposed consists on a goat dairy farm, which could reach a maximum production of 500 liters of milk a day. This zone is semiarid, which has been over grazed and its water table depleted, thus an estabulated intensive goat ranching practice has been selected. In the first stage, a cross of local goats with Alpine and Toggenburg studs will be used; this will lower the costs of herd acquisition. The fodder will be made with dry fiber (corn, sorghum, alfalfa or coquia) and green matter produced in hidroponic systems by the same farm. The unit will also have a milking station. As this productive unit will be experimental, it will include a small cheese factory and the production will be commercialized in the local market. We expect that will take between 8 to 10 years to develop the necessary units to have a commercial production for foreign markets. It is hoped that the project, once developed, will increase the income of the families incorporated, revalue the land and recuperate the interest for agricultural practices. The experimental unit is due for financial support from the government, although the authors already own the land, a herd of 70 "criollo" goats, pastures and some infrastructure. All the technical and cost calculations have been already submitted to the government authorities (Federal and State levels). An environmental plus, would be the release of the pressure on grazing land allowing its recovery.



Introduction

Almost all the species of livestock common in Europe were introduced in Mexico. Thus, domesticated exotics were abruptly introduced in the ecosystems, causing drastic environmental changes. The colonization of Baja California Sur, located in NW Mexico, was accompanied by the introduction of cattle, goats and horses, thus, establishing a ranching tradition here. The great degradation of the natural resources is causing an abandonment of agricultural practices, an emigration of youth to the cities and the selling of rural land. The accelerated development of tourism, has unchained a process of land speculation, mainly by foreign real state companies which buy the land at an extremely low cost and sell it at very high prices. In this process, the farmer loses his land and in a short time is left with no money, thus becoming poorer and easy prey for very low income labor.

Considering this scenario the region needs social and economic alternatives that allow its communities to survive. The State Plan for Development (Plan Estatal de Desarrollo 1999 – 2005 and 2005 - 2011) establishes the need of a new approach to solve the problem of agrarian development. This new approach must be based on precise evaluation and diagnostic of the human and natural resources of each community, as well as on their own needs and expectations. According to the Plan, this strategy will allow an active participation of the communities in deciding their forms of development. That would give an opportunity to work towards the governability of these communities and in this way open a door for the establishment of democracy, in the modern sense. The official approach points to the social and economic structural reorganization of the rural production in the regions that compose the state territory.

This regional planning is based on a hydrological basin model, considering that we deal with a semi-arid region, where the most limiting factor for agricultural development is the availability of ground water.




It is expected that these changes will take place in a long range term, since would be impossible to change the socioeconomic structures established for almost a century. In this sense, the State Plan adopts a two way strategy, on one hand the development of infrastructure and basic services, and on the other hand the adoption of actions towards the modification of the socioeconomic structures of the region. The development of the agricultural practices in the San Juan de los Planes basin, started in the fifties (decade starting in 1950), reaching a climax on the seventies and then went downhill in the nineties. The water table was over exploited and the signs of saline intrusion in the wells obliged the government to close many of them. The problem is getting worst with time, leaving the land useless, without possibility of cultivation. This problem requires the search of new alternatives which involves changes in the social structure and the introduction of new technologies and economic models.

Thus, our proposal comes to fulfill a need of the government, as well as a need of the community: to restructure the productive system. It is a viable alternative that at difference of the traditional practice will first test the model in an experimental productive unit and then, if successful, will be transferred to the community. The goal is to eventually, develop a goat dairy micro region, based on intensive management units supported by the use of hydroponic green fodder, and sized to be managed at the family level. This will allow the use of small quantities of water, reduced space and high sanitary control. Will also, permits to monitor the production, the health and genetic quality of the herd and strict costs of production.

Study Area

The study area is within the Borough (Delegation) of San Juan de Los Planes, and located at Lat. 24° 23' N and Long.109° 56' W (Fig. 1). The vegetation is typical of the arid coastal desert, belonging to the Gulf Coast Desert Subregion, characterizes by low and succulent plants, sporadic flowering and slow growth, which is already highly disturbed (Roberts 1989, Maya & Guzmán 1998, INEGI 2001).



Figure 1. San Juan de Los Planes, Baja California Sur, México. Geographical position: 23° 58' N and 109° 56' W.



The Conservation Science Program of the WWF has identified 825 terrestrial ecoregions across the globe, as priority areas for conservation due to their biodiversity, and assigned the key number NT1324 to the **San Lucan xeric scrub** ecoregion, where our project is located. This ecoregion is in the Cape Region, in the southern end of the peninsula of Baja California Sur, which is of Neotropical origin, compared to the Nearctic genesis of the rest of the Peninsula (Olson et al. 2001, WWF 2001). It is also included within the Sonoran-Baja Deserts ecoregion, according to a wider classification also presented by the WWF, under the Global 200 project (WWF 2001).

The project area is located in San Juan de los Planes borough, in the hydrographic basin of San Antonio–San Juan de los Planes, within the municipality of La Paz, Baja California Sur, Mexico. The municipality covers a 20,274.98 Km² territory, and most of it is mountainous and arid desert, not proper for agricultural practices. The head of the borough is the village of San Juan de los Planes, at 42 km from La Paz and 194 km from Los Cabos, the two closest potential markets.

The Project Description

According to interviews with experienced ranchers of the region we, a priory, design the size of the module in the range of 200 to 300 animals. This estimation is based in the amount of labor needed to handle the module, which will be basically composed by the herd enclosures, feed lot, an area for free raging, where to allow the animals to exercise, the milking station, the kids lot, the hydroponic greenhouse, and the pasture storage. We are not considering the cheese factory as part of the module, since the processing and marketing of products will be a separate operation, basically planned as a community business, probably as a cooperative. Thus the milk producers will sell their milk to the cheese plant. In this way we expect a better performance and efficiency at each level of the production chain.

One of the key elements of each dairy farm or unit will be the use of hydroponic fodder. Primary trials have shown that hydroponically germinated corn, only with water as a medium, is an excellent feed. It takes from 10 to 12 days to be at its best as a fodder. We estimate that a 120 to 150 m² greenhouse will produce around one ton of green fodder a day, which will basically cover the needs of a module. The proportion of hydroponic fodder and pasture to be used is about 3:7 respectively. For the dry fiber part (pasture) is intended the use of corn, sorghum, alfalfa or coquia. The first three crops are common in the area and the coquia is just being introduced with very good results. Hydroponia present great advantages for environmental conservation practice as well as in economic terms; it saves considerable amount of water and the product is of the highest quality. For each kilogram of seeds the yield is over 12 kilograms of fodder. Besides the herd enclosures and the greenhouse, the pilot module will include a cultivation field of three hectares, with good water supply which will be dedicated to the production of one or more of the crops selected to cover the needs of fiber in the diet. In total the module will use 5 hectares of land.



There is no much local experience with the production of greenhouse fodder, so the model proposes to start with the acquisition of a 60m² commercial greenhouse, in order to learn its management and adapt it to the local climate conditions, to the hardness of water and the types of fodder to be produced. It will be essential to select the right type of shade screen to use in the summer and winter seasons, and to control the humidity levels within the greenhouse. Trial exercises have shown that plants are very sensitive to fungus and bacterial infections. Thus, temperature and humidity have to be strictly controlled. The pilot module is intended to serve as the experimental unit that will allow setting the methodological process and standards, to acquire experience in the management and production of goat milk, to evaluate costs of production and as the training base for the local ranchers interested in starting their own units. It is also intended to provide studs to the starting units, in order to upgrade the quality of the breed, since the proposal is to start the herds with criollo females and alpine, Toggenburg or Nubian studs.

Discussion

Our thesis is that if we develop productive units that can be established and managed at the family level as private enterprises; they could be integrated, at the community level, in the processing and marketing. We are not proposing a new model; rather, we are taking advantage of different sustainable experiences, which can be put in practice in San Juan de los Planes. The more novel and challenging part of our proposal is to incorporate new productive techniques, in a community and region, which is by tradition very conservative when it comes to accept changes. We must consider that the Mexican policies and developing programs has been historically very paternalistic and generally based on decisions taken by the Central Government with very little or no knowledge of the real needs of each particular community and their natural resources. These programs, with few exceptions, have ended up in failure and demoralize the people; on the other hand, they see these programs as a source of income since the government never monitors them or request results. As a conclusion, it can be said that the Government strategy for rural development is obsolete and has failed to fulfill the needs of the communities, nevertheless, the Government is aware of this situation and is in the process of establishing a new planning strategy, in agreement with the present needs of the country, and the region in particular. This new action plan contemplates the support to projects that will help to impel it, and brought forward by different sectors of the community and Universities.



REFERENCES:

- Gobierno de Baja California Sur. 1999. Plan Estatal de Desarrollo 1999 2005. La Paz, B.C.S., Mexico.
- Gobierno de Baja California Sur. 2005. Plan Estatal de Desarrollo 2005 2011. La Paz, B.C.S., Mexico. http://www.bcs.gob.mx
- INEGI (Instituto Nacional de Estadística, Geografía e Informática). Anuario Estadístico del Estado de Baja California Sur, México, 2001.
- Maya, Y. & J. Guzmán. 1998. Recursos terrestres y suelo. Chapter V, Pp.165-242, *in*: S. Mahieux (Ed.). Diagnostico Ambiental de Baja California Sur. Published by Soc.Hist. Nat. Niparaja, A.C.; Univ. Autónoma de B.C.S. & Fundación Mexicana para la Educ. Amb., La Paz, México.
- Olson, D.M., E. Dinerstein, E.D. Wikramanayake, N.D. Burgess, G.V.N. Powell, E.C. Underwood, J.A. D'amico, I. Itoua, H.E. Strand, J.C. Morrison, C.J. Loucks, T.F. Allnutt, T.H. Ricketts, Y. Kura, J.F. Lamoreux, W.W. Wettengel, P. Hedao, and K.R. Kassem (2001). Terrestrial Ecoregions of the World: A New Map of Life on Earth. BioScience, Vol. 51 No. 11: 933 938.
- Roberts, N. C. 1989. Baja California Plant Field Guide. Natural History Publishing Company. La Jolla, U.S.A. 309 pp.
- UNCED. 1992. AGENDA21: Programme of Action for Sustainable Development. Earth Summit. Rio de Janero. 3-14 June 1992.

WWF (2001). Conservation Science Program: Ecoregions.

http://www.worldwildlife.org/science/ecoregions.cfm

http://www.worldwildlife.org/science/ecoregions/g200.cfm



ANALYZING OF RELATIONSHIPS BETWEEN TRADE AND ENVIRONMENT : ECONOMIC AND SOCIAL LINKS

Nuray TERZİ

Marmara University, Department of Economics., TURKEY nurayterzi@marmara.edu.tr

Fundemantal change in the last three decades has seen in our world. World trade volume has increased at an annual rate of 6 percent since the beginning of 1980's. The increase in world trade volume was more than world output and it has increased at an annual rate of 3.5 percent in the same term. WTO affected the development of world trade volume, positively. Developed and developing countries started the liberalization of international trade respectively. The world has also seen enormous environmental change. Global carbondioxide emissions, and increase in nitrogen is creating deserts of lifelessness in our oceans and lakes. Economic theory offers a causation between trade liberalization and environmental quality. Trade liberalization can benefit the environment by increasing economic growth and providing resources for resolving environmental problems. Trade liberalization can also harm by stimulating trade in environmentally-damaging products. In addition, environment can create employment and lead to job losses. Environment can also causes health problems. Trade-environment create new challanges. The relations between trade and environmental are dynamic and complex. This paper is aim to analysis the linkages between trade and environmental. In particular, this study will examine from the perspectives of economic and social the linkages between trade and environment.

1. Introduction

Trade liberalization can benefit the environment by increasing economic growth and providing resources for resolving environmental problems, by increasing trade in pollution-control products, and by eliminating government policies that contribute to market failures. Trade liberalization can also harm the environment by promoting economic growth under conditions of market failure, and by stimulating trade in environmentally-damaging products (Wilson; 1994). In addition, environmental impacts include those measured by air, water or land pollution associated with the enterprises producing traded products. There could also be natural resource, leading to either higher or lower resource depletion or environmental degradation, depending on the scale and resource-efficiency of enterprises following liberalization. (UNEP: 2001)

The process of economic globalization is also leading to serious problems Trade policies are clashing with environmental standards, undermining national environmental protections. Forests, fisheries and other treasures of the world's natural heritage are overexploited as they are subjected to global market demands. In the last fifty years, the world has also seen enormous environmental change. Global carbondioxide emissions, and the steady increase in nitrogen releases from cars and fertilizers is creating deserts of lifelessness in our oceans and lakes.



Human have changed ecosystems more rapidly and extensively than in any comparable period of time in human history. The net loss of global forest area during the 1990's was about 94 million hectares. Half of the world's fish stocks are being fished at their biological limits. In twenty years 3.5 million people will live in countries facing "water stress" less than 1,000 litres of water per year per person (UNEP; 2000: UNEP; 2001).

Environment can also create social effects. Preserving and improving the environment can provide new job or cause job losses. Moreover, the income gap between rich and poor continues to increase and poorer households face relatively greater financial impacts from the introduction of environmental politicies than wealthier households. In addition, environment-related health problems have increased, particularly environment-related health problems in children has been growing over the past decade.

In generally, the relationship between trade and environment is discussed from the different points among the scientists. Up till now, many researches have been studied on this subject. In this article, it will be discussed the environmental effects of trade liberalization and environment-related social effects, and will be examined by economic point of view. In this respect, the article is organized as follows: section two reviews economic and social the linkages between trade and environment. Section three focuses debates on trade and environment. Section four presents possible proposals against problems of trade-environment. Finally, section five draws general conclusions.

2. The Relationship Between Trade and Environment: Economic and Social Links

The neo-classical theory states that free trade strategies lead to a win-win result : all participants gain. Trade promotes economic growth and welfare improvement in the exporter as well as the importer country. Growth enables governments to tax and to raise resources for a variety of objectives, including the abatement of pollution and the general protection of the environment. Moreover, growth affects positively the demand for a good environment. Also, trade enables pollution fighting-technologies available elsewhere to be imported. Free trade can lead to better environmental outcomes also from a shift in the composition of production (Muradian-Martinez; 2001).

Strong empirical evidence supports economic theory that free trade creates growth in per capita income and wealth as well as other social benefits, such as individual liberty. The great spurts of modern economic growth occurring over the past 200 years, both in individual countries and in the world as a whole, have coincided closely with periods of liberalization of trade and commerce. Those developing countries that have made the most economic progress since World War II are those that have liberalized trade and promoted exports. Political democrazation, entrepreneurial development, rapid technological advance, free flowing scientific information, and open capital markets are synergistic with each other and lead to economic growth and development. The demand for environmental amenities is highly responsive to increase in income. Trade also facilities the transfer of technologies, including those that economize on environmental goods. Compared with autarky, international trade also conserves the use of scarce natural resources, including those that are closely associated with environmental quality, such as forests and water (Gardner, 2004).



Environmental effects of trade liberalization can be group into five broad categories of: Product effects, scale effects, structral effects, technology effects, regulatory effects (UNEP: 2001). Product effects occur when the products have an impact on the environment or development. Some of the products traded may be environmentally, friendly, while others may be dangerous to the environment. Product effects therefore can be positive or negative, depending on the nature of the products traded as well as their volume(UNEP, 2001). Scale effects occur when liberalization causes an expansion of economic activity. If the nature of that activity is unchanged but scale is growing, then pollution and resource depletion will increase along with output. Structral effects occur when increased trade leads nations to specialize in the sectors where they enjoy a comparative advantage. When comparative advantage is derived from differences in regulatory stringency then the structral effect of trade will exacerbate existing environmental and social problems in the countries with relatively lax regulations. Technique effects can lead to a decline in pollution per unit of output. The liberalization of trade and investment may encourage the transfer of clenear technologies to developing countries (Gallagher and Taylor, 2003) Trade reforms may have regulatory effects, that is, may have impact on environmental regulations and standards. On the positive side, trade agreements include measures to improve environmental standards. But it is also possible that particular provisions of trade reforms may affect on a government's ability to set environmental protection standards (UNEP,2001).

The relationship between trade and environment can be formed by income side. Income effects are central to analysis of the environmental Kuznets curve - the relation between pollution and per capita income. One of the leading explanations for the improvement in environmental quality in rich countries is that environmental quality is a normal good, and so governments who are responsive to consumers regulate pollution more intensively in higher income countries. There is some evidence to support income effects. Dasgupta et al.(1995) develop an index of environmental policy. Their index is highly correlated with income, with high income countries having more effective policy. Pargal and Wheeler (1996) in their study of Indonesia find that the effectiveness approaches in influencing environmental quality are positively correlated with income. Income effects are important the effects of trade on the environment because the motivation for trade liberalization is usually to increase real income in a country. However, where there are income effects, there are typically substitution effects as well. And since trade liberalization changes relative prices, we should expect both income and substitution effects to play an important role in determining the responsiveness of environmental policy to trade liberalization (Copeland, 2005).

Another relationship between trade and environment is foreign direct investment. Trade and particularly foreign direct investment in developing countries in the long-term are very good for the environment. Foreign direct investment in developing countries, it's good in the short-run as well, particularly when multi-national firms invest in developing countries, it can be seen an increase in the standards of living there. In addition, when firms invest in developing countries, they build plants. This begins to put pressure on firms to lift their environmental standards up to the levels both for occupational safety and health and environment protection in the developing world. So both in the short-term and in the long-term, international trade and foreign direct investment are friends of the environment (Portney, 2000).



As trade creates important effects, environment can create social effects : environment-related employment effects and health effects. Environment-related employment effects can be classified into different categories: positive and negative effects or direct and indirect effects. Preserving and improving the environment can create new or preserve existing jobs. People are employed in the design, construction and operation of pollution abatement equipment and facilities. Employment may also be increased by specific job creation programmes directed towards environmental projects. On the other hand, environmental programmes can force plants to close down. They can cause price increases, and thus lower demand, production and employment. And they might induce firms to shift new production capacity to foreign countries which have less stringent pollution control regulations. Direct employment effects are the first round changes in demand, output and employment induced by increased expenditures in environmental protection. Environmental expenditure involve, along with other non-environmental expenditures, indirect. These can include employment effects due to: the demand for intermediate goods and services induced by environmental expenditures, multiplier effects through increased wage incomes generating further demand and employment, relative wage and price effects, and displacements effects due to the diversion of regular investments by pollution control investments (OECD, 2003).

Pollution abatament activities also require labor input. Thus, environmental regulations may also create jobs – sometimes in the same industry, or even in the same firm. In addition, environmental regulation may cause firms in a particular industry to shift production and jobs from areas not attaining federal air quality standards to those in attainment. Job loss in one area is then accompanied by job creation in another. (Morgenstern, Pizer and Shih, 2002)

Environment can also affects different members of society. Poorer households face relatively greater financial impacts from the introduction of environmental politicies than wealthier households. There has also been some concern that poorer households reap fewer of the benefits of such policies, facing greater exposure to local air pollution and other environmental risks such as those which arise from living in proximity to manufacturing establishments or hazardous waste treatment and disposal facilities.(OECD, 2006).

Environment can have important effects on human health. Millions people die from urban air pollution, and there is reason to believe that the urban poor suffer most. These environmental risk factors contribute less than 5 percent of the disease burden in rich countries, despite much higher levels of urbanization, industrial development, and energy consumption – all of which are usually associated with environmental pollution and health problems. It is true that general health status is better in rich countries; the total burden of illness and death from all causes per million people is about half that in developing countries. Still, the disease burden from environmental risks in the rich countries is smaller than in developing countries (Lvovsky, 2002).

As a result, the relationship between trade and environment is both economic and social. On one hand, trade provides economic growth, and economic growth contributes environment quality. On the other hand, if economic growth is provided, negative effects of environment on human life is decreasing such as environment-related negative employment effects and negative health effects.



3. Debates Between Trade and Environment

The trade and environment debates continue in a vast field. According to Bhagwati and Dixit trade is a mechanism that transfer the goods of the industrialized world to less-developed countries, and this view is supported by history. Throughout the twentieth century, and especially its second half trade liberalization brought huge welfare benefits to Southern Bhagwati therefore argues that trade liberalization countries: should continue. Environmentalists agree that trade leads to economic growth and economic growth is good for populations. Where economists and environmentalists disagree is in the relationship between growth and the environment with economists arguing that growth helps the environment and the environmentalists that it hurts, If it is true that the environment is doing well, then economists can contunie pursuing growth as usual. Environmentalists, however, maintain that the environment is not doing well and that it will not support continued, trade driven growth of the global economy (Lofdahl, 2002).

One of debate focuses on pollution-intensive industries. This debate has reflected concerns in developed countries that their competetive position would be croded by environmental regulations that encourage pollution-intensive industries to move to countries with lower standards. Environmentalists, on the other hand, fear that increasing trade integration and the competition for investment and jobs may lead to a "race to the bottom" on environmental regulations, as national governments find it more difficult to internalize environmental and social costs into prices (Busse; 2004).

Another key point of disagreement is the role of international competition in determining environmental and labor standards. Some researchers argue that competition promoted by free trade will encourage lowering of environmental standards and wages at a global level, producing environmental deterioration in both North and South and lower wages and enlargement of unemployment in the North. According to this position, free competition between different cost-internalising regimes is utterly unfair because it would produce a 'race to the bottom'. Overpopulation and the high rates of population growth in the South will collobarate to maintain the wages in poor countries low and to push the northern wages downward (Muradian-Martinez, 2000).

The links between trade and environment are brought into clearer focus in the case of regional trade agreements. On the one hand, if trading partners have dissimilar environmental endowments then the potential economic and environmental benefits of reallocation of production along more efficient lines is likely to be considerable. Moreover, these benefits may be complemented by benefits from increased diffusion of more advanced technologies and increased demand for environmental quality, with relatively poorer countries likely to benefit more. However, on the other hand, there is likely to be considerable tension between the potential gains from regional trade liberalisation and the perceived costs to individual countries and sectors (Johnstone, 1999).



In a global market, countries with weak property rights sell their natural resources to countries with strong property rights. Trade thus pressures importers to weaken their own environmental standards, thus proviking a worldwide race to the bottom. A classic example of this is the export of fish from countries with an unregulated fishery to those with fishery regulations., but one can easily expand the notion of a resource to include clean air or water. A country importing dirty products essentially leaks its polluting to exporting countries that have less strict standards. (Yu, Sutherland and Clark 2002)

International organizations have started considering the importance of environmental concerns in their policies. In the early 90's IMF also decided to include environmental considerations in its lending programs, since major environmental problems could affect macroeconomic variables, thereby threatening stability. International organizations have also developed purely environmental facilities making environmental governance and policy an issue of its own in international lending. But although international organizations have been developing environmental issues in their policy making, critics still consider their programs and policies to have mainly adverse effects on the environment. International organizations are critized for being badly coordinated and even for not considering environmental problems as their priority in their relations with borrowing countries. International organizations are accused of harming the natural environment. Clearly, the question whether international organizations harm or benefit the environment is empirical in nature (Dreher, Ramada-Sarasola, 2006).

Another debates focuses negative social effects of environment. One of debates is about whether environmental regulations create employment or not. The employment impacts of environmental policies was first raised as an issue at the beginning of the 1970's when such as policies were introduced. The question of the relationship between environmental policies and unemployment came back at the surface in the 1990's when many countries faced high level of unemployment (OECD, 2003).

Morgenstern et al.(2002) examined the effects of environment on employment. Morgenstern et al. anaylzed four heavily polluting industries: pulp and paper, plastics, petroleum, and steel in US. Between 1984 and 1994, total environmental expenditures rose by \$ 4.9 billion. During the same period total production employment in those industries declined by almost 632.000 jobs. The environmental spending may have accounted for the loss at most 14.000 jobs, or about two percent of the jobs lost over the period. On the other hand, environmental spending may have created as many as 29.000 jobs. There are strong positive employment effects in industries where environmental activities are relatively labor intensive. They found that their results don't support the notion of a jobs versus the environment trade-off. They believe that this subject is politically and emotionally charged topic that attracts attention. According to them, both employers and employees overestimate the potential for job loss associated with environmental regulation or firms may fear that they will be less adept in responding to new regulation than their competitors.



Narayanan examined the existence of trade-off between environment and employment in the Indian textile industry, by determining the impacts of environmental regulations on the employment. He found that environmental regulations enhance the efficiency of process in the sub-sectors, thereby increasing output and employment. However, the external ban on azo dyes exerts a negative impact on the employment of the industry as a whole though it has had no impact on the pollution intensive ones. So, environmental regulations need not affect the employment in the future and the possible job loss might be compensated by the job requirements arising from the compliance to these regulations (Narayanan, 2005).

OECD work indicate that environmentally-related activities in the private, public and tertiary sector have become a significant source of employment in a number of OECD member countries. Existing data show that the direct employment effects in the environmental goods and services sector alone vary between 0.4% and 3.0 % of total employment in OECD countries; and between 1% and 1.5% in the majority of countries. According to OECD, the economy-wide employment effects resulting from environmental policies are very limited. But environmental policy can have some effect on employment in the short term and in specific sectors. (OECD, 2006)

Harabi investigated emprically the factors affecting direct employment changes due to ecoinnovations at the firm. He used data from around 1600 firms in five different countries. (Germany, Great Britain, Italy, Holland and Switzerland). He has obtained the following empirical results: Firms investing in relatively important labor cost saving product innovations that have not been subsidized by the state and pursuing a market driven business strategy that leads to increase of their sales in industries in which they have a market power also increase the likelihood of their achieving a positive long term direct employment effect. Firms that deviate from this ideal portrait do not have positive direct employment effects (Harabi, 2005).

Another debate is effect of environment on human health. Environmental factors are a significant determinant of health and illness in poor countries. In general, environmental health risks fall into two broad categories: traditional hazards related to poverty and lack of development, such as lack of safe water, inadequate sanitation and waste disposal, indoor air pollution, and vector-borne diseases; and, modern hazards such as urban air pollution and exposure to agro-industrial chemicals and waste that are caused by development that lack environmental safeguards (www.worldbank.org).Traditonal environmental hazards affect developing countries and the poor most. Modern threats to human health prevail in industrial countries that have managed to reduce their citizens' exposure to traditional environmental hazards. But the urban poor bear the brunt of air pollution. Urban air pollution, for example, hits its highest levels in China, India and a number of cities in Asia and Latin America. Urban people often live in densely populated neighborhoods where dirty household fuels are used and where garbage is burnt nearby and that are close to traffic corridors or industries. Thus, the poor of this world are increasingly experiencing the "double burden" of both traditional and modern environmental health risks. Poor people typically face greater environmental health risks because of basic infrastructure services and unhealthy locations (Lvovsky, 2002). Environment-related health effects, particularly in children, has been growing over the past decade. Many OECD countries are reporting asthma epidemics exacerbated by air-pollution.



For example, in the United States nearly 1 in 13 school age children (approximately 4.8 million in total) has asthma, and the rate is increasing more rapidly in school age children than in any other group. (OECD, 2006) In addition, in low income countries, the rate of under-five mortality is larger than middle income or upper income countries (Table 1).

Table 1: Environment and Health

(under-five mortality rate/per 1000 live births)

| Low Income Countries | 122 |
|-------------------------------|-----|
| Middle Income | 37 |
| Lower Middle Income Countries | 40 |
| Upper Middle Income Countries | 28 |
| Low and Middle Income | 86 |

Resource : The World Bank, Little Green Data Book, 2006.

As a result, trade versus the environment, environment versus labor: it's a false opinion. There is no trade-off here. Trade promotes economic growth. Economic growth benefits the environment in the long term. And environment also creates employment in long term. The effect of environment on human health is about economic growth. When countries develop, this problem will be removed. In the following section, existing suggestions are given.

4. Different Proposals about Trade and Environment

The debates on trade and environment also bring different solutions on this subject. There are many proposals to help deal with different kinds of problems that arise in this trade versus the environment debate. They can be grouped into four categories : market-based regulations, legal and institutional regulations, financial regulations, and managerial regulations. One approach to solve the problems with trade and environment is market-based regulations. One way to address environmental issues is to remove obstacles to incomplete markets. The vast majority of environmental degradation can be attributed to situations in which environmental resources are not properly valued, leading to so-called positive or negative externalities. These arise due to inefficient property right systems, or imperfect or asymmetric information, and government failure, where government policy focuses more on special interest groups rather than the general public (Busse, 2004). Another way to address environmental issues in the context of trade is to encourage countries, and work with together to eliminate harmful subsidies. To eliminate government subsidies that harm the environment, including energy, agriculture and fishing subsidies can be helped achieving environmental objectives. (Nordstrom and Vaughan 1999, Portney, 2000). Another proposal that has been discussed to address environmental degradation of individual firms or countries is eco-labelling schemes. Product labelling requires that imported goods be distinguished by labels that state, for instance that the product has been produced without, or with very little, environmental degradation. Consumers in industrialized countries might be ready to pay a higher price for improved standards. This approach could also lessen concerns about low standards expressed by trade unions in high income countries and non-governmental organizations, and could provide an incentive for firms in the exporting nations to upgrade their standards without binding rules.(Busse, 2004)



The second approach to deal with these issues is use of multinational environmental agreements (Portney, 2000) and to have an international environmental organization (Burtless, 2000). Portney discussed that it is necessary to negotiate multilateral environmental agreements, and it is necessary to work with the World Trade Organization, so that when those multinational environmental agreements do have provisions that allow for penalization, trade restrictions on signatories that are not enforcing the terms of the agreement, that the WTO will recognize the legitimacy of these things and will not shoot down multilateral, environmental agreements because of trade concerns. According to Portney, the World Trade Organization has been created to facilitate and enhance world trade. It's probably not the right place to try to hash out disputes over differing environmental standards from country to country. The creation of a world environment organization can be a solution. To discuss concerns about international environmental practices outside of the WTO and trade forum would be conceivable to create or strengthen an environmental branch in the world court to deal with tuna, dolphin, shrimp, sea turtle, and other kind of international environmental disputes.

The third approach is financial. It can be provided direct assistance to developing countries so that to the greatest extent possibly they can leap frog the dirty technological periods In order to do this, developed countries have to be willing to extend international aid. (Portney, 2000). Especially, technical assistance which is supported with financial aid can introduce cleaner and more environmentally friendly methods of production abroad. (Oates, 2000)

The fourth approach is to reinforce relationships among countries. The best policy for developing countries, the generalisation of a development path intending to change current comparative advantages and to reinforce country networks of co-operation and trade. (Muradian- Martinez-Alier, 2000) Policy coordination between developing and developed countries is also vital to minimize environmental costs. Hovewer, the challenges differ: the developing countries face the challenge of the minimizing pollution level while the developed countries that of reducing it. Both activities require coordination among the countries. The reason trade and environmental disputes is the reliance on political rather than economic / technological solutions. The intensity and type of environmental measures vary across issues and countries. Therefore harmonizing environmental measures can create an inefficient atmosphere. (Jayadevappa and Chhatre, 2000) Public accountability and good governance are essential to good environmental policy. A superior solution can be to evaluate the likely consequences of proposed policies from the economic and environmental perspectives, simultaneously. This would lead not only to a more constructive dialogue between economists and environmentalists but also to better trade policies that would take into consideration the world's poor and the global environment. (Nordstorm and Vaughan, 1999).



5. Conclusions

This paper aims to examine the relationship between trade and environment from the point of economic and social links. The relationship are dynamic and complex. Economic activities are dependent on trade and environment. The trade-environment has been shown emprically to create some problems. Trade can create additional environmental pressures. At the same time, environmental pressures can create health and employment problems. One probable solution is economic growth. Economic growth can provide better living conditions. The other solution is to approach these problems from multidimensional perspective. The trade and environment relationship is not a homogeneous that can be seperated. The problem is itself a multidimensional that cannot be solved according to one dimensional perspective. Many researches brought solutions about this subject. All of them is convenient to meet environmental needs at present and in the future. In this respect, trade-environment related problems can be evaluated with market-based, legal/institutional, financial, and managerial. (Table 2) This solution will also provide important results for sustainability.

| Market-Based Regulations | ➢ Eco-labelling |
|----------------------------------|---|
| | Remove obstacles |
| | Eliminate harmful subsidies |
| Legal /Institutional Regulations | Multinational Environmental Agreements |
| | Discuss outside of the WTO |
| | International Environment Organization |
| Financial Regulations | Direct asssistance |
| | Technical assistance |
| Managerial Regulations | Reinforce relationship among countries |
| | Policy coordination |
| | Public accountability and good governance |
| | To evaluate simultaneously |

| Table 2. Regulations about frace and Environment |
|--|
|--|

REFERENCES:

Busse, Mattias. 2004. "Trade, Environmental Regulations And The World Trade Organization: New Emprical Evidence" Journal of World Trade, 38; 2, pp. 285-306.

Copeland, Brain R. 2005. "Policy Endogeneity and the Effects of Trade on the Environment", Agricultural and Resource Economics Review.

Dreher- Magdelana, Axel Ramada-Sarasola. 2006. "The Impact of International Organizations on the Environment : An Emprical Analysis", Working Papers No.131. Konjunkturforschungsstelle Swiss Institute.

Gallagher, Kevin P. and Robin Taylor. 2003. "International Trade and Air Pollution: The Economic Costs of Air Emissions from Waterborne Commerce Vessels in the United States" Global Development and Environment Institute, Working paper No. 03-08.

Gardner, B. Delworth. 2004. Globalization, Free Trade, and Environmental Quality, Stanford CA: Hoover Press.



Harabi, Najib. 2000. "Employment Effects of Ecological Innovations: An Emprical Analysis" Solothurn University of Applied Sciences Northwestern Switzerland, A Discussion Paper 2000-07.

Jayadevappa, Ravishankar and Sumedha Chhatre, 2000. "International Trade and Environmental Quality: a Survey" Ecological Economics, 32 ,pp. 175-194.

Johnstone, Nick.1999. Trade and Environment : Economic Links, Politicas Ambientales Comercio Internacional en los Paises del Cono Sur, Buenos Aires.

Lofdahl, Corey. 2002. "Does Trade help or hurt the Natural Environment : Perspectives from Lateral Pressure Theory", Science Applications International Corporation, Massachusetts.

Lvovsky, Kseniya. 2002. Environment & Strategy Notes: Health, Poverty, The World Bank.

Morgenstren, Richard D., William A. Pizer and Jhihshyang Shih. 2002. "Job Versus The Environment : An Industry Level Perspective" Journal of Environmental Economics and Management 43, pp. 412-436.

Muradian, Roldan and Joan Martinez – Alier. 2001 "Trade and The Environment : from a "Southern" Perspective" Ecological Economics 36 pp. 281-297.

Narayanan, G. Badri. 2005. "Effects of Trade Liberalisation, Environmental and Labor Regulations on Employment in India's Organised Textile Sector" Working Paper Series No. WP 2005-005.

Nordstorm, Hakan and Scott. Vaughan. 1999. Trade and Environment. Geneva: WTO.

Oates, Wally; Portney, Paul. 2000. A Brookings/Resources for the Future Press Briefing Trade, Labor & the Environment Preview of the IMF/World Bank Meetings, The Brookings Institution.

OECD. 2003. Environment and Employment : An Assessment, OECD.

OECD. 2006. The Social Dimension of Environmental Policy, OECD Policy Brief.OECD.

OECD. 2006. The Distributional Effects of Environmental Policy, Ed. Yse Serret, Nick Johnstone.OECD.

UNEP. 2001.Economic Reforms, Trade Liberalization and the Environment : A synthesis of UNEP Country Projects.

UNEP.2000. Environment and Trade A handbook, UNEP.

Wilson, Arlene. 1994. GATT, Trade Liberalization, and the Environment: An Economic Analysis, CRS Report for Congress.

Yu, Douglas W. William J. Sutherland and Colin Clark. 2002. Trade Versus Environment, Trends in Ecology & Evolution, Vol. 17 No. 7, pp. 341-344.





A STUDY ON THE POTENTIALS OF BEYŞEHIR NATIONAL PARK WITHIN THE FRAMEWORK OF ENVIRONMENT-SENSITIVE TOURISM (ECOTOURISM) APPROACHES

Ü.Gülsüm TER, Kadriye (DENİZ) TOPÇU, Sedef ERYİĞİT

Selcuk University, Faculty of Engeneering and Architecture, Department of City and Regional Planning, Konya, Turkey, gulsum28@yahoo.com, gulsumter@gmail.com, denizk@selcuk.edu.tr, seryigit@selcuk.edu.tr, sedefsendogdu@hotmail.com

Ecotourism, which was developed in reaction to mass tourism, protects natural and ecologic balance and is regarded as a kind of environment sensitive tourism, is one of the important means in handing on natural, ecological and cultural structure for the next generations by contributing to the conservation of natural, cultural, and historical values making radical changes in them.

This research intends to determine the natural, cultural and historical potentials of Beyşehir National Park, assess them in terms of ecotourism, and develop strategies of conservation and use in order to ensure their sustainability. In this context, firstly, area analyses and observations were made and interviews were held with authorized people. A SWOT analysis was conducted so as to reveal the strengths and weaknesses of the research area and determine the opportunities and threats faced; on the other hand, a questionnaire was prepared to determine people's views in this regard, their participation in and contribution to tourism activities. As a result of the evaluation of the data obtained, strategies were developed in order to consolidate the weaknesses of the research area, prevent threats and ensure the sustainability of the natural and cultural potentials.

Key Words: Tourism, sustainable tourism, ecotourism, Beyşehir National Park, Beyşehir.

1. Introduction

Tourism, which is regarded as a variety of activities integrated with the purposes of vacationentertainment, self-refreshment and self-improvement and spending leisure time, which arises from the desire of the individual to travel different places from working and living place, is one of the most significant and most emphasized social facts in the present. The kind of tourism which is introduced by three concepts; sea-sun-sand (3S), also known as mass tourism, finds acceptance as an event which is blended with vacation, entertainment and spending one's leisure time. Non-recoverable negative effects of mass tourism on local cultures, eco-systems, environmental and socio-cultural values, developing the new formulas such as the "all inclusive system" in recent years, have decreased to interest to the mass tourism. These reasons have increased the needs of alternative kinds of tourism which are integrated with the nature, blended in different cultures and new tourism destinations out of the daily lives, consider next generations [9]. Alternative kinds of tourism have emerged as the result of these needs and requirements.



Ecotourism, which is sensitive to environment, is one of the significant means of sustainable tourism because of the fact that it provides support for the people to protect their freedoms in the most appropriate way without causing major changes in their social, cultural and historical values and in their lifestyles [6].

2. Environment Sensitive Tourism: Ecotourism

Ecotourism is one of the most popular and fastest growing tourism market in the present. Growth rates for ecotourism are estimated to range between 10% to 30% annually compared to 4% for tourism overall, with the greatest growth in the ecotourism industry anticipated to occur in the international market [1-5-10-11-14].

The Ecotourism Society (TES 1998) defines ecotourism as: "purposeful travel to natural areas to understand the culture and the natural history of the environment; taking care not to alter the integrity of the ecosystem; producing economic opportunities that make the conservation of the natural resources beneficial to the local people" [7-15]. Similarly, The World Conservation Unions (IUCN) Commission on National Parks and Protected Areas (CNPPA) also defines ecotourism as: "environmentally responsible travel and visitation to relatively undisturbed natural areas, in order to enjoy and appreciate nature (and any accompanying cultural features & both past and present) that promotes conservation, has low visitor impact, and provides for beneficially active socio-economic involvement of local populations" [15-4-16].

The above definitions indicate that ecotourism is a complex phenomenon, involving integration of many actors including tourists, resident peoples, suppliers, and managers and multiple functions (Ceballos-Lascurain 1993). They also suggest that, in ecotourism, natural areas and local populations are united in a symbiotic relationship through the introduction of tourism [15-16].

Ecotourism is operationally characterized as a form of tourism activities and development that produces;

- A minimal negative impact on the host environment,

- An evolving commitment to environmental protection and conservation of resources,

- A generation of financial resources to support and sustain ecological and socio-cultural resources,

- An active involvement and cooperation of local residents as well as tourists in enhancing the environment, and economic and social benefits to the host community.

Ecotourism is expected to be environmentally and socio-culturally sustainable. Most definitions of ecotourism posit sustainability as a requisite characteristic. Ecotourism that emphasizes the appearance of sustainability based on adherence to best practice thresholds and timely rectification of any inadvertent negative impacts that are identified [17-8-3]. Ecotourism, which is now performed all around the world in order to explore places which the people have not seen before, has also frequently came up on the agenda in our country in recent years.



Turkey has a wonderful biodiversity as the result of its climatic diversity, in addition to its rich historical and cultural heritage and has also an incomparable richness with its natural values such as its mountains, forests, highlands, coasts, lakes, rivers, with its flora and fauna and interesting geological formations like caves and canyons. These riches make Turkey a place of interest for ecotourism [13-12].

3. Method

The aim of the research is to develop the balance between conservation use strategies for future in order to determine the natural, cultural and historical potentials of Beyşehir National Park, which has mostly rural characteristics and in which tourism potentials can not be fully evaluated, to evaluate these potentials in terms of tourism and to ensure its sustainability. In this context; *SWOT analysis* was performed in order to determine strengths-weaknesses and opportunities of the research area and the threats which it faces to, a questionnaire was applied in order to determine resident people's ideas on this topic, their participations in tourism activities and their contributions to tourism. The survey study was conducted on 73 respondents by taking the 0.001 sample of the population (54.734 people) of the Beyşehir National Park by using SPSS 13.0 software. After the evaluation of the data gathered from the research, strategies were developed in order to strengthen the weak points of the research area and to prevent threats, and suggestions were brought forward for ensuring the sustainability of its natural, cultural and historical potentials.

4. Site Description: Beyşehir National Park

Beyşehir, located in the Lakes District of the Mediterranean Region, is an important crossing point of the region. The distance of Beyşehir from its south end to the Mediterranean is 65 km. It is bounded by city of Konya to the east, Doğanhisar, Hüyük and Ilgın to the north, Derbent to the north-east, Şarkikaraağaç and Eğirdir to the north-west, Yenişarbademli to the west, Sütçüler to the south-west, Derebucak to the south and Seydişehir to the south-east (Fig.1.).



Figure 1: The Location of Beyşehir



The boundaries of the Beyşehir National Park, which was announced as a national park in 1993 because of its natural and historical values, formed the universe of the research (Fig.2.). Beyşehir National Park, which is spread on an area of 88.750 acre and which also includes the Beyşehir Lake, encloses the central district of Beyşehir, the townships of Yeşildağ, Kurucuova and Gölyaka and the villages Çiflikköy, Akburun, Bademli, Gölkaşı, Karadiken, Kuşluca, Budak and Çukurkent. There also exist 33 islands which are of importance in terms of their historical and natural values within its boundaries.



Figure 2. The Boundaries of Beyşehır National Park

The evaluation of the natural, cultural and historical resources of the research area in terms of ecotourism can shortly be summarized as follows;

The history of Beyşehir and its environs reaches back to the Neolithic age. Although Beyşehir had lived under the rule of the Lydians, Persians and Romans, it gained its real identity during the Seljuk period. Beyşehir, being the settlement of the ancient civilizations, is at the same time one of the rare region where many scenic beauties exist together. There are many monuments and artifacts belong to this age like Eflatunpinari (Fig. 3) and ruin of the Misthia Antique City.

The main important historical artifacts of the district are *The Kubadabad Palace* (Fig. 4), which was established as the summer residence of Seljuk Sultan Alaeddin Keykubad in 1228, lies on the coastal of Beyşehir Lake, on the skirts of the Anamas Mountain, *Eşrefoğlu Süleyman Bey Complex* which was built by Eşrefoğlu Seyfeddin Süleyman Halil Bey between the years 1296-1299, met the religious, commercial, social cultural and educational needs of the period with its mosque, tomb, bedesten (bazaar), Turkish bath, madrasah, fountain and library. Eşrefoğlu Süleyman Bey Complex serves only as a mosque in the present day (Fig. 5). The Bedesten, which is one of the oldest Ottoman bedestens in Anatolia, was restored by the General Administration of Foundations and has been used for socio-cultural purposes. The restoration projects of the Eşrefoğlu Turkish Bath, known as *Çifte Bath*, have also been prepared but the restoration process has not yet been started. Furthermore, all that remains from the citadel built in the Seljuk period is the *northern gate* (Fig. 6). The walls of the citadel were completely destroyed and its foundations remained under the ground to a large extent.



Another historical artifact belonging to this period is *Taş Madrasah* or İsmail Ağa Madrasah (Fig. 7), *Taş Bridge* which is located in Beyşehir settlement and built as a regulator, was the first irrigation project implemented during the Ottoman period (Fig. 8). It has become the symbol of Beyşehir. Besides these main artifacts listed above, it is also possible to mention a number of mosques, tombs, Turkish baths, caravansaries, fountains etc. Furthermore, the examples of civil architecture in the region have also significant historical and cultural potentials. Based on the information regarding all these artifacts, it would not be wrong to say that Beyşehir National Park has the characteristics of an open-air museum with its historical and cultural values.

Beyşehir National Park has an importance in terms of its historical and cultural potentials and including one of the few fresh water lakes in the world. The Beyşehir Lake is an important natural resource which can be positively used within the context of ecotourism for coast, lake and camp (caravan) tourism. Settlements like Gölyaka, Gölkonak and the other coasts are suitable for lakeside tent camping areas. At the same time, there are 33 islands (K1z Castle (Fig. 9), Hac1 Akif etc.) on the Beyşehir Lake (antique name Caralis Lacus) (Fig. 11). Moreover, the Yakamanastır, located near the boundaries of the national park and within the 1st Degree Natural Site, is the most important recreation area of the region which offers an accommodation facilities and has attractive landscape characteristics (Fig. 10).

Together with its landscape characteristics, the Beyşehir Lake is also an important shelter for migrating birds. The islands on the lake are important places for the settling and brooding of the waterfowls. The Leylekler Valley, located on the migration route of the storks and settled by them in the spring, the islands on the lake and the lake shore are suitable places for *ornithology* (Fig. 12). Besides the bird species, researchers have met with a new species of insect which belongs to the class of Coleopter in the area for the first time in the world. Moreover, Dedegöl Mountains located in and around the Beyşehir National Park, are home to various and rare kinds of plants

Beyşehir Lake constitutes the main resource value of the national park, as it provides opportunities for *water sports activities*. Together with the lake, mountains which are located closed to national park such as Anamas (Fig. 13), Kartaltepe (2987 m.), Dippoyraz (2890m.), and Dedegöl Mountains (2992 m.) are suitable places for mountaineering (trekking etc.). The east side of these mountains is the easiest ways to climb the summits. In addition, there are pine forests which can be utilized for *mountain tourism*. In general sense, Beyşehir National Park and its close environs have also a significant potential for *nature-sports tourism*. The national park has a rather convenient location for activities within the nature-sports tourism such as paragliding, mountaineering, mountaineering track, winter mountain climbing, rock climbing at every level, alpinism tour, jeep safari tour, trekking courses (nature trekking), mountain lake camping, equestrian nature trail, camping, mountain biking, water sports, kamaran and lake canoeing.



Besides these potentials, the *natural caves* within the national park and its close environs could be evaluated for ecotourism. 39 caves have been examined until today, and the most important ones are Körükini Cave, Suluin Cave and Balatini Cave, which is a ponor cave (Fig. 14). Moreover, Adaini Cave, located on the Hacı Akif Island, and the caves in the environs of Derebucak, Kurucuova, Yeşildağ, and Başgöze have significant resource value for *nature photographers (for photo safari)*.

Another significant characteristic of the Beyşehir National Park is the *sunset*. While the sun sets in the horizon, Anamas Mountain composes a wonderful scene with the lake. Beyşehir lake sunset scene is considered as one of the first degree sunsets in terms of its color and setting time (Fig. 15). It is regarded as the most beautiful sunset scene with the Leman Lake in Switzerland [2].

Besides, the highlands (Damla, Ecirli, Dikilitaş, İslibucak, Pınargözü Highlands) which are in and near the environs of Beyşehir National Park are used by the local people and the nomads as pastures and vacation. Furthermore, every year Ecirli Highland, hosts 1500 people who come especially from Antalya region for festivals and stay for a week (Fig. 16).

5. Evaluation Of Analysis Results

Analyzing and knowing the strengths and weaknesses of the research area, in a definite way in ecotourism will help to determine the appropriate strategies for the goals of it. In this context, a *SWOT analysis* evaluating the cultural, historical and natural potentials of Beyşehir National Park and its environs was performed primarily to serve as a guide in producing ecotourism strategies.

It is observed from the SWOT analysis that the strengths of Beyşehir National Park show in a variety (Table 1). However, a number of historical, cultural and natural potentials that are included in the strengths are either never used or not adequately evaluated. This situation underlines the necessity for effectively evaluating the strengths and for over strengthening the weaknesses of the national park in determining the strategies towards the development of ecotourism.



| Table | e 1. | Evaluatio | on of th | e historical, | natural | and | cultural | potentials | of Bey | şehır] | National | Park |
|-------|------|-----------------|----------|---------------|---------|-----|----------|------------|--------|---------|----------|------|
| with | SV | VOT anal | ysis | | | | | - | - | - | | |

| STRENGTHS | WEAKNESSES |
|---|---|
| -Many historical artifact within Beyşehır National Park | -Not to conserve the natural, cultural and |
| such as Eflatunpinar, Fasillar Monument, Kubadabad | historical inheritance enough. |
| Palace, Eşrefoğlu Süleyman Bey Complex, Citadel Gate, | -Undevelopped the infrastructure in a |
| Taş Bridge etc | desired level for ecotourism. |
| -The restoration of historical artifacts and the budget | -Lack of accommodation |
| obtained from the Ministry of Culture to conserve the | -Inadequacy of ecotourism oriented |
| historical heritage. | financial source and investment incentives |
| -Existing history, culture and nature together. | Insufficient budget for eactourism and |
| -Existence of the few fresh water lakes in the world | -insufficient budget for ecolourism and |
| (Beyşehir Lake) | marketing |
| -Existence of coastal and forests around the lake | -Being unconscious for the existing natural |
| (Yakamanastır etc) | and cultural potentials' importance. |
| -Existence of natural beauties and clean air. | -Undevelopment of the consciousness of |
| -Having a chance for fishing | people regarding to ecotourism |
| -Islands on the Beyşehir Lake (33 units) and natural | -Disinterest of public and private sector |
| beauties around the lake that lies down 120 km. | -Inadequacy of publicity signboards |
| -Islands are an area of to winter, brood and settle for diver | -Having no benefits from the potentials |
| species, some tern species, ducks and waterfowls. | enough that mentioned above. (caves, |
| -Rushy areas within the district have importance for birds | highlands, islands etc) |
| in terms of feeding and brooding. | -Insufficient budget for GEMBOS project. |
| - The richness of water resources | ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ |
| -Unique beauty of sunset. | |
| - The rivers and streams which flow to the Lake are | |
| suitable for sport activities such as rating, canoe, river | |
| Skillig etc Having baachas lika Üstüpler Varbası, etc. | |
| Having comping cross | |
| -Fnabling to vitalize the domestic-foreign tourism with | |
| diversifying touristic products (highland tourism with | |
| tourism etc.) | |
| -Fxistence of highlands | |
| -Having temperate climate in comparison with its | |
| environs | |
| -Existence of mountains which are convenient for | |
| alpinism winter sports etc. (Anamas Mountain Dedegöl | |
| mountains etc). | |
| -Having social-cultural richness | |
| -Existence of local handcrafts | |
| -Having interesting caves | |
| -Being an unexplored destination | |
| -Being within the national main transportation network. | |
| -Being a destination for foreign and local tourists | |
| -Having a hunting areas | |



| Table 1. Cont. | |
|--|--|
| <i>OPPORTUNITIES</i> | THREATS |
| -The increase of the interests to the sensitive tourism. | -Running out of the lake water excessively with |
| -Developing transportation possibilities and | the purpose of irrigation in agricultural activities |
| depending on this developments of long distance travel | -Pollution of the lake |
| opportunities | -Deforming of natural environment by conscious |
| -Being closer to the big cities (such as Antalya, | and unconscious usage. |
| Konya, Ankara) | -Unconscious approach of local people to the |
| -To be GEMBOS project -a canal project that will | tourism |
| heighten the water level of the lake by pumping water | -Rapid structuring along the coastal |
| from Mediterranean- is at the implementation stage. | -Unproviding enough publicity of the district on |
| -To give way to ecotourism in the projects in | the national and global scale. |
| which the European Union provides financial support. | -Having no studies related to continuing and |
| -Providing benefit from different kinds of tourism | developping handcrafts. |
| at the same time | -Extinctence in fish and game types |
| -Enables to perform or implement of different | |
| recreative and touristic activities in each season | |
| -Being organised lake festivals every year | |
| -Positive approach of the district local people to | |
| the tourism | |

Table 2. Respondent Profile

| Category | | % | Category | | % |
|-----------|-----------------------------------|------|------------|-------------------|------|
| Condon | Woman | 32,9 | | employer | 8,2 |
| Genuer | Man | 67,1 | | officer | 21,9 |
| | 18-25 | 23,3 | | retired | 9,6 |
| | 26-35 | 16,4 | Occuration | farmer | 9,6 |
| Age | 36-45 | 26,0 | Occupation | house wife | 17,8 |
| | 46-55 | 23,3 | | self-employed | 21,9 |
| | 56-65 | 8,2 | | student | 5,5 |
| | 66 + | 2,7 | | others | 5,5 |
| | has not learned how to read write | 1,4 | | Less than 250 YTL | 1,4 |
| | primary school | 21,9 | Total | 251-500mTL | 23,3 |
| Education | secondary school | 17,8 | income of | 501-750mTL | 37,0 |
| | high school | 35,6 | | 751-1bTL | 19,2 |
| | University | 23,3 | | more than 1 bTL | 19,2 |



According to the survey application results which constitute the second stage of the research, respondents living at the district showed an attitude defending the necessity of avoiding from weaknesses and supporting the strengths indicated in the SWOT analysis, results of which are given above. Especially, historical buildings (94.5 %), Beyşehir Lake and the islands (93 %) are the main characteristics that attract the respondents. The evaluation of the questionnaire shows that local people take notice of the sunset, the existence of mountains and forests, a number of interesting caves, the opportunity for bird watching and highlands in terms of ecotourism (Table 2-3).

| Potentials | Very important (%) | Important (%) | Not important (%) |
|---|-----------------------|---------------|----------------------|
| Historical artifacts and monuments (Eşrefoğlu Complex, Eflatunpınarı etc) | 94,5 | 5,5 | - |
| Beyşehir Lake and islands | 93,2 | 6,8 | - |
| Mountains and forests | 54,8 | 42,5 | 2,7 |
| Interesting caves | 58,9 | 34,2 | 6,8 |
| Hunting areas | 34,2 | 45,2 | 20,5 |
| Ornitologie | 56,2 | 39,7 | 4,1 |
| Sunset | 89,0 | 11,0 | - |
| Highlands | 47,9 | 37,0 | 15,1 |

Table 3. The potentials that make Beyşehir National Park attractive in terms of tourism



figure 3. Eflatunpinari



Figure 4. The Kubadabad Palace





Figure 5. Eşrefoğlu Süleyman Bey Complex



Figure 6. Citadel Gate



Figure 7. Taş Madrasah



Figure 9. Kız Castle



Figure 8. Taş Bridge



Figure 10. Yakamanastır



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



Figure 11. The Beyşehir Lake



Figure 13. Anamas Mountain



Figure 12. The Leylekler Valley



Figure 14. Suluin Cave



Figure 15. Beyşehir Lake Sunset



Figure 16. The Highlands

Vast majority of the respondents who took part in the questionnaire consider the insufficiency of tourism investment, incentives and accommodations as the most important factors which prevent the development of tourism. Insufficiency of infrastructure facilities, lack of publicity and marketing, unconscious approach to the tourism, inadequate investment to the district and legal statute follow these factors. Respondents stated that the current resources which are not appreciated and evaluated adequately as one of the reasons that prevents the development of tourism (Table 4).



| Tablo 4. | The reasons | for not to | developped | the tourism | in Bevsehır | National | Park |
|----------|--------------|-------------|------------|-------------|-------------|------------|--------|
| 14010 1. | I ne reasons | 101 1101 10 | actopped | the tourism | ını Deyşenn | 1 varionai | I uIII |

| Reasons | Very important (%) | Important (%) | Not important (%) |
|---|--------------------------|------------------|-------------------------|
| Legal statue (Being a national park, archeological and nature site) | 63,0 | 19,2 | 17,8 |
| Lack of infrastructure | 87,7 | 11,0 | 1,4 |
| Lack of accommodation | 91,8 | 6,8 | 1,4 |
| Lack of tourism investment incentives (<u>having</u> not government support) | 93,2 | 6,8 | - |
| Insufficient publicity and marketing | 79,5 | 17,8 | 2,7 |
| Could'nt make the local people conscious of tourism | 72,6 | 24,7 | 2,7 |
| No investments to the district | 72,6 | 26,0 | 1,4 |
| Existance of undiscovered values | 49,3 | 39,7 | 11,0 |

Tablo 5. The situation of supporting the studies oriented to tourism on Beyşehir National Park

| Supporting types | I support the idea a lot (%) | I support the idea (%) | I don't support the idea (%) |
|--|---------------------------------|---------------------------|---------------------------------|
| To run a house as a pension | 31,5 | 41,1 | 27,4 |
| To participate in the studies oriented to protect the | 76,7 | 23,3 | - |
| To open a foundation oriented to tourism | 38,4 | 52,1 | 9,6 |
| To give financial support | 17,8 | 41,1 | 41,1 |
| To support non governmental organizations (NGOs) | 57,5 | 41,1 | 1,4 |
| To support the improvements of publicity | 69,9 | 30,1 | - |
| To participate to the educational meetings. | 78,1 | 20,5 | 1,4 |



When the respondents were asked their participation in the development of ecotourism, they stated that they would participate in educational meetings (78,1%), contribute to the projects aimed to the protection of the environment (76,7%), support the publicity of the national park (69,9%) and work with non-governmental organizations (NGOs) (57,5%) and could run their houses as a pension (27,4%). They stated that they could not provide financial support and could not establish new facilities because of the financial insufficiency. On the other hand they indicated that they could able to do these kinds of activities through government support (Table 5).

6. Discussion and Conclusion

The gradually changing perception of tourism in the world and changes in the newly formed tourist profiles have been accelerating the improvement of the tourism kinds which are sensitive to the nature. When it is evaluated from this aspect, Beysehir National Park with its historical artifacts and its natural and cultural richness is a strong candidate for ecotourism in Turkey. The result of the SWOT analysis indicates that Beyşehir National Park and its environs have a wide variety of resources for ecotourism. However, a number of historical, cultural and natural potentials that are listed in the strenghts are either never used or not adequately evaluated. This situation underlines the necessity for effectively evaluating the strenghts and for achieving the weaknesses in determining the strategies towards the development of ecotourism. Today, historical, cultural and natural sources which are not evaluated effectively form the most important base for development strategies. However, inadequacy of the publicity, insufficient conservation of these values, and the failure in evaluating them for the purpose of tourism prevent the improvement of ecotourism. According to the data obtained from the evaluation of the survey and SWOT analysis, in order to conserve these resources, to provide their sustainability and to use them effectively and efficiently, development strategies which are sensitive to the nature such as the following should be determined;

- It is prior to integrate with tourism by preserving the historical, cultural and natural potentials and to ensure the sustainability making use of them effectively.

- Protecting Beyşehir Lake and eliminating the factors which cause decreases in the water level. When the GEMBOS project concluded, water level of the lake can be heightened

- Tourism master plan consisting the land use decisions for the Beyşehir National Park and its environs should be prepared. Also, systematic scientific and technical support should be given, together with finance for the development of master plans. A technical commission is required to create overall and local development plans in accordance with regional and country plans.

- Effective planning of resource use, protection of biodiversity, supporting local economies, participation and consultations with local populations, training the qualified staff, and responsible marketing,

- The protection zone of the national park should only be accessible for scientific studies, and tourism activities should be prohibited in there.

- Providing facilities such as bank loan and tax reduction for every kind of investment which will be carried out in this district,

- Increasing national and international publicity facilities,



- Making the resident people to be educated and be conscious of the importance of historical, cultural and natural values and their usage in tourism.

- Ensuring that the visitors are being directed by information bulletin boards and signboards in accordance with the activities which will be carried out in the national park, determining alternative ecotourism routes interest groups, (*ecotourism routes related to the lake*: center of Beyşehir– İçeriada - Hacı Akif island / center of Beyşehir - Çiftlikköy cove - Kıstıfın island - Akburun island- Tolca sett./ center of Gölkaya - Aygır island - İğneli island - Eşek island - Kilise island - Mada island - Kumluca sett. *-Ecotourism routes based on natural, historical and cultural values;* Dumanlı highland, Yüksek helvaovası highland, Aşağı helvaovası highland , Düden highland, Dumanlı highland, Kızınmezar highland, Yeşildağ sett., Kurucuova sett., Gölkonak sett., Gölyaka sett., Kubad Abad Palace, Ecirli highland, İsli bucak highland, Melanda Bath, Pınargözü highland , Kestel highland, Huğlu sett., Karacadağ sett., Kurtçular citadel, Üzümlü sett., Şamlar, Yakamanastır, Beyşehir sett., Çiftlikköy sett., Gölkaşı sett., Eflatunpınarı, Sadıkhacı sett., Sevindik district, Emen district, Değirmenönü Tumulus, Çiftlikköy Sett., Budak sett., Yenice sett., Çukurkent sett., Kıreli sett., Çavuş sett., Akdağ sett., Pınarbaşı sett., Hüyük sett., Mutlu sett., Görünmez sett., İmrenler sett., Sekli sett.) (Fig. 17).



Figure 17. Tourism Routes

- Providing different tourism facilities in the national park which are attractive, safe and where the ecotourists could spend money.

- Meeting the visitors' accommodation requirements in cheap, comfortable and local buildings

- To improve the local economy and living standards with peoples' participation for environment sensitive tourism.

- Providing the contribution of local handcrafts.
- Development of ecotourism kinds which are undisturbed the nature.



Applying of these strategies in Beyşehır National Park and its environs, it can be provided improvements which indicated below;

- Employment opportunities could increase,
- Tourism revenues could be equally distributed,

- Local infrastructure could be improved (transportation, communications, access to and provisions of goods and services),

- Accessibility to social benefits could be heightened (e.g. Health care, education),

- Intercultural relations could be improved (through positive interactions from host and tourist),

- Passive and active learning could be provided through interpretive services in protected area or ecotourism site,

- Awareness and nature appreciation for visitors and local residents could be heightened,
- Contribution to maintenance, protection and management of natural area and its inhabitants could be provided with the money generated from tourism revenues,

- Conservation could be occurred by concerned participants in ecotourism (through active involvement),

- Local and foreign tourists could contribute to the local economy,

In conclusion, in order to fulfill the strategies listed above and to be successful in ecotourism planning; with an urgent implementation of the necessary projects and actions are required. The protection of natural, cultural and historical potentials of the Beyşehır National Park, using them effectively for the purpose of ecotourism within the balance between conservation use depends on the cooperation of the private sector, eco-tourists, central and local government and especially with the local people. *It will be an important step to ensure its sustainability and to transfer these values to the next generations by providing this cooperations.*

REFERENCES:

[1] Ayala, H., "Resort Ecotourism: A Paradigm for the 21. Century", Cornell Hotel and Restaurant Administration Quarterly, October, p. 46-53, **1996.**

[2] Alperen, B., "Beyşehir ve Tarihi", Büyük Sistem Dershanesi Matbaası, Konya, 2001.

[3] Burns, P., "Ecotourism Planning and Policy 'Vaka Pasifika'?", Tourism and Hospitality Planning & Development, Vol. 2, No. 3, p. 155–169, **2005.**

[4] Ceballos-Lascurain, H., "Tourism, Ecotourism and Protected Areas: The State of Nature-Based Tourism Around the World and Guidelines for its Development", Gland, Switzerland, and Cambridge: International Union for the Conservation of Nature and Natural Resources, **1996.**

[5] Dimanche, F., Smith, G., "Is Ecotourism an Appropriate Answer to Tourism's Environmental Concerns?", Journal of Hospitality & Marketing, 3 (4), p. 67-76, **1996.**

[6] Dinç, H., "Kitle Turizmine Dönüşük Politikaların Faturası ve Bir Karşı Tepki: Alternatif Turizm Arayışları", Türkiye'de 19. Dünya Şehircilik Günü Kolokyumu, Mimar Sinan Üniversitesi, İstanbul, **1995**.

[7] Epler Wood, M., "Ecotourism at a Crossroads: Charting the Way Forward", The International Ecotourism Society, Burlington, VT, USA, **1997.**



[8] Fennell, D., "Ecotourism: an Introduction", London, Routledge, **1999.**

[9] Gökçe, F., "Alternatif Turizm Çeşidi Olarak Doğu Karadeniz Bölgesinde Yayla Turizmi", Türkiye'nin Alternatif Turizm Potansiyeli Sempozyumu, Çankırı, **2000.**

[10] Lindberg, K., B.Furze, M. Staff, and R. Black, "Ecotourism in the Asia-Pacific Region: Issues and Outlook, Bennington, VT: The Ecotourism Society, **1997**.

[11] Mader, R., "Going Green: Focus on Ecotourism at Acapulco's Tianguis", Business Mexico, June, p.34-35, **1998.**

[12] Önder, S., Polat, A.T., "Konya İli Karapınar İlçesi'nin Ekoturizm Yönünden Görsel Kalite Değerlendirmesi ve Swot Analizi", S.Ü. Ziraat Fakültesi Dergisi 18 (33), sf. 80-86, Konya, **2004.**

[13] Özkan Yürik, E., "Turizmin Geleceği: Eko Turizm", Standart Dergisi. Ajans Türk Matbaacılık Sanayi A.S.ISSN 1300-8366 Yıl:42 Sayı:500 Ankara, **2003.**

[14] Reingold, L., "Identifying the Elusive Ecotourist", Going Green: A Supplement to Tourism & Travel News, October 25, p.36-37, **1993**.

[15] Ross, S., Wall, G., "Ecotourism: Towards Congruence Between Theory and Practice" Tourism Management, 20, p.123-132, **1999**.

[16] Tsaura, S.H., Linb, Y.C., Linc, J.H., "Evaluating Ecotourism Sustainability From The Integrated Perspective of Resource, Community and Tourism", Tourism Management, 27, p. 640–653, **2006**.

[17] Weaver, D., "Asian Ecotourism: Patterns and Themes", Tourism Geographies, 4(2)



ENVIRONMENTAL IMPACT ASSESSMENT AND SUSTAINABLE TOURISM. THE CASE OF ALBANIA. Liljana ELMAZI, Mirela MERSINI,

Faculty of Economics and Business, University of Tirana, Albania lilibilla@yahoo.com

Tourism depends for its success on the quality of the natural and human environment. It is well established that tourists'travel preferences are strongly influenced by destinations' cultural and natural environments. As such, the long-term viability of the industry in any location depends on mantaining its natural, cultural, and historical attractiveness.

Since the tourism industry has much to gain from being a leader in implementing sustainable tourism development – and much to offer in that area – this paper examines sustainable tourism development. We discuss how an ecological approach to impact assessment can aid in identifying such key factors as the examples that contain lessons of what is economically and ecologically sustainable. We conclude by discussing emerging opportunities for ecotourism.

An environmental impact assessment (EIA) is one mechanism for determining the capacity. An EIA should take into account the relationship between demand from travelers and the sensitive environmental characteristics of the site. Unfortunately, the actual capacities of many locations are only partially known or have been learned only in retrospect. An ecosystem approach to travel planning, one that accounts for demands of other industries on the environment, will help create plans for sustainable tourism and development.

Key words: EIA, sustainable tourism, cultural and natural damage

The goal of sustainable development

To prevent environmental or cultural damage that curtails tourism, hotel operators and planners need to cooperate with gonvernment authorities and managers in other industries to establish planning strategies and other mechanisms to ensure that tourism to a locale does not exceed the capacity of that destination. The goal of sustainable tourism can be achieved if the capacity of the many attributes of a destination to support human activity can be assessed and not exceeded.

As the term is widely used, sustainable development means the use of natural resources to support economic activity without compromising the environment's carrying capacity, which is its ability to continue producing those economic goods and services. Tourism is particularly sensitive to carrying capacity. To perform its essential economic functions over the long term, tourism has to be conducted in a way that ensures the continued attractiveness of the locale in which it takes place.



The ecosystem is used in this paper provides a way of viewing humans within their natural world; an environmental impact assessment offers predictions regarding the effects of planned development; carrying capacity emphasizes production over the long term; and environmental monitoring gives feedback to decision makers who control economic activity.

Challenge

The Albanian Gonverment has make a statement for the global tourism sector. This statement identified the steps needed for the industry to become environmentally sustainable. The following action items were particularly important to developing sustainable tourism.

- Create a nationwide institutional framework for sustainable tourism, including long-term strategy development and creation of more-comprehensive policy and planning structures;
- Protect the resource base central to the industry's success;
- Establish parterships of tourism providers with host communities and with private enterprise to build sustainable tourism;
- Develop better inventory and monitoring systems for both the resource base and the actions of tourists;
- Use improved technology and design to minimize negative impact;
- Take advantage of market opportunities for a greener (i.e., less damaging) tourism product; and
- Develop standards for the industry and encourage collaboration at all levels in the development and implementation of effective regulatory mechanisms.

Together, these building blocks constitute an agenda for the industry to take charge of its own future – to build a more sustainable industry through better planning, better management, and cooperation that addresses tourism's common concerns. In essence, achievement of this agenda will make tourism a leading industry adopting the principles that have emerged from worlwide conclaves on sustainable development.

Sustainable tourism

To prevent environmental or cultural damage that curtails tourism, hotel operators and planners need to cooperate with gonvernment authorities and managers in other industries to establish planning strategies and other mechanisms to ensure that tourism to a locale does not exceed the capacity of that destination. The goal of sustainable tourism can be achieved if the capacity of the many attributes of a destination to support human activity can be assessed and not exceeded. An environmental impact assessment (EIA) is one mechanism for determining the capacity. An EIA should take into account the relationship between demand from travelers and the sensitive environmental characteristics of the site. Unfortunately, the actual capacities of many locations are only partially known or have been learned only in retrospect. An ecosystem approach to travel planning, one that accounts for demands of other industries on the environment, will help create plans for sustainable tourism and development.



Tourism depends for its success on the quality of the natural and human environment. It is well established that tourists'travel preferences are strongly influenced by destinations' cultural and natural environments. As such, the long-term viability of the industry in any location depends on mantaining its natural, cultural, and historical attractiveness.

That being said, we must also state another obvious point: unless responsible management practices are in place, the tourism industry can end up degrading the features on which its prosperity is based. Tourism can put stress on local environments because it consumes substantial amounts of energy, goods, and resources. Particularly in sensitive environments, the tourism industry can be a significant force either for maintenance and improvement or for degradation and decline. Tourism managers, therefore, face the challenge of improving the effectiveness of their management of the relationship between tourism and the environment. As well, actions arising from other economic sectors affect the quality of and access to specific sites. Since those actions can degrade the environment on which tourism depends, tourism management needs to be integrated with management of other economic sectors.

Since the tourism industry has much to gain from being a leader in implementing sustainable tourism development - and much to offer in that area - this paper examines sustainable tourism development. We discuss how an ecological approach to impact assessment can aid in identifying such key factors as the examples that contain lessons of what is economically and ecologically sustainable. We conclude by discussing emerging opportunities for ecotourism.

Taking Charge

Sustainable development means the use of natural resources to support economic activity without compromising the environment's carrying capacity, which is its ability to continue producing those economic goods and services. Tourism is particularly sensitive to carrying capacity. To perform its essential economic functions over the long term, tourism has to be conducted in a way that ensures the continued attractiveness of the locale in which it takes place.

The essential concept to a discussion of sustainable tourism developmentis ecosystem that provides a way of viewing humans within their natural world; an environmental impact assessment offers predictions regarding the effects of planned development; carrying capacity emphasizes production over the long term; and environmental monitoring gives feedback to decision makers who control economic activity.

The steps for environmenally tourism sustainable

There are some steps needed for the industry to become environmentally sustainable.

- 1. Create a nationwide institutional framework for sustainable tourism, including longterm strategy development and creation of more-comprehensive policy and planning structures.
- 2. Protect the resource base central to the industry's success;
- 3. Establish parterships of tourism providers with host communities and with private enterprise to build sustainable tourism;



- 4. Develop better inventory and monitoring systems for both the resource base and the actions of tourists;
- 5. Use improved technology and design to minimize negative impact;
- 6. Take advantage of market opportunities for a greener (i.e., less damaging) tourism product; and
- 7. Develop standards for the industry and encourage collaboration at all levels in the development and implementation of effective regulatory mechanisms.

Together, these building blocks constitute an agenda for the industry to take charge of its own future - to build a more sustainable industry through better planning, better management, and cooperation that addresses tourism's common concerns. In essence, achievement of this agenda will make tourism a leading industry adopting the principles that have emerged from worlwide conclaves on sustainable development.

Carrying Capacity for Sustainable Tourism

The tourism industry can benefit from management approaches that anticipate and prevent the problems that occur when carrying capacity is exceeded. Unfortunately, a simple definition of carrying capacity as a single threshold value is inadequate in nearly all cases, because carrying capacity is determined by many interrelated factors. The determination of carrying capacities for tourism and the evaluation of the importance of differing resources meets with the following obstacles.

- 1. Tourism depends on many attributes of an environment, such as cleanliness, presence and diversity of wildlife, access to shoreline, abundance of wildflowers, and ability to support various activities; each attribute responds in its own way to different levels of use.
- 2. The impact of human activity on an environment may be gradual, and may affect various parts of the system at differing rates. Some aspects may have precipitous thresholds (e.g., habitals for fragile or endangered species), while others degrade gradually when overused (e.g., water quality).
- 3. The sensitivity of an environment depends in part on the linkages between that environment and others. In one site it may not matter to anyone whether a river is diverted or a breakwater built, while in another site a change in flow may be critical because downstream or further along the coast some person, business, or species depends on that source of water.
- 4. Different types of use create different impacts (e.g., walking disturbs land less than trail biking, which in turn is less damaging than horses' hooves; hunting is consumptive, while photographing wildlife is not).

Using an ecosystem-based approach helps overcome these obstacles by reflecting the sensitivity of different attributes of the environment to different types and levels of impact or use.


Assessing Environmental Impact (EIA)

Environmental impact assessment (EIA) is a tool for identifying and analyzing a region's key attributes. The results can then influence decisions regarding whether to proceed, choices of design and construction schedules, and procedures to mitigate unwanted effects.

An EIA typically follows these steps:

- 1. inventory of social, political, physical, and economic environment;
- 2. forecast or projection of trends;
- 3. setting of goals and objectives (usually project level);
- 4. examination of alternatives to reach these goals;
- 5. selection of the preferred alternative (from number 4);
- 6. development of implementation strategy;
- 7. implementation; and
- 8. evaluation.

While a fairly simple site-focused EIA can be considerable value in identifying key biological and physical factors that developers or those who regulate them need to know, we find that it is often an incomplete approach and may miss many important considerations and effects. In particular, site-specific reviews often miss the impact that occurs off a development site (such as damage to downstream communities) and overlook effects that are the result of many small actions, each of which appears too small to be important (such as the cumulative impact of pollution from hundreds of small cottages on a lake's water quality.

Evaluating The Ecosystem

Planners will find long lists of environmental attributes to be considered in any of several EIA manuals, but the points is to try to establish the linkage between these attributes and the benefits that are obtained from using them. Those linkages help the planner focus on achieving optimal results in the development processes. He or she can then ask, how do attributes of the environment provide opportunities for tourism development, and, how is the site's development potential limited by its environmental characteristics or by the likely impact of its development on the interests of others?

The key for development planners is to identify early in the process which functions and benefits are likely to be important to tourists.

Managers need a clear framework for addressing the relationship between the characteristics of an environment and its human uses. This framework uses an "ecosphere" approach to evaluation. In this approach, the relationship between human systems and the environment is portrayed as one of supply and demand, thereby retaining certain aspects of the traditional attitude toward nature. The environment is shown as the source of all goods, services, and experiences, and as the base resource on which is founded the ability to satisfy human wants and needs, as well as those of other species. The many different attributes of the environment are the basic resource that supports tourism and other economic activities in a given locale.



The demand side of the ecosphere model is driven by human numbers. The total human demand on the system is the result of population numbers modified by the attitudes and expectations of each person (call it the "footprint" of each person on the planet. Together, population and consumption demands by each person yield a wish list to be satisfied from the environment (e.g., food, shelter, security, education, culture, and recreation). Since the natural products and conditions of the environment are frequently not in the form demanded or located where the demand occurs, people have modified the supply to satisfy the demand.

Determining Carrying Capacity

This framework provides a broad means of determining optimal use of a given location. A complex balance must be maintained: human wants against an ecosphere-s sustained ability to serve those demands. Our measurement of this objective must reflect"

- 1. the basic physical and biological attributes of the ecosystem;
- 2. the current uses of the environment;
- 3. the sensitivity of each part of the environment to future actions;
- 4. what is lost when we change the environment and who loses it; and
- 5. the extent to which we can change the existing environment and still maintain its valued characteristics.

The biophysical capacities of various environments are only partially known at present. We know, for example, that areas in cold climates frequently have a limits capability to rebound from an impact (e.g., vehicle tracks) and that areas with simple food webs are easily disturbed, but little is known of the potential cumulative effects of human activity on complex ecosystems.

Planners must make a concerted effort to assess the complex mix of values associated with human use of each site.

What Decision Makers Need to Know

As has been discussed, the tourism manager needs some measure of carrying capacity to reduce the risk of unknowingly stepping over biological or cultural thresholds and thereby damaging the manager's own business or adversely affecting others. Examples abound of locations where tourism activity has degraded an environment to the point that it can no longer support its original type or level of tourism. So do examples where the actions of others have affected the ability of the environment to continue to be attractive to tourists. As tourism planners and promoters, we may be less sensitive to the fact that the actions of tourists have also adversely affected attributes valued by other sectors (e.g., noise effects on wildlife and adjacent communities, sewage pollution of local fisheries).

If a planner is looking at a proposal for a 100-room hotel overlooking an alpine lake on a site that borders on a meadow and a peat bog, an essential question is, what is the carrying capacity of the site? Can it support 100 rooms, 1000 rooms, or none at all? The carrying capacity of the site depends on:



- (1) the existing ecosystem,
- (2) who or what is making use of the site,
- (3) the type of activity proposed for the site,
- (4) surrounding land and water uses,
- (5) the design of the facility,
- (6) the values of the users,
- (7) the likelihood that the valued products and services currently obtained from the site will be damaged by the proposed development, and
- (8) proposed levels of management to control impact.

The key for the decision maker is the identification of the important values, and the rational analysis of the tradeoffs. If management develops a strict policy of nightly cleanup, the site may be able to handle more rooms. If the lake is too cold for swimming, a certain group of tourists will stay away and overall use of the site may be lower. Say, for example, that the resort operator will put in a paved, two-lane highway to the site. That could encourage traffic beyond the level expected for a 100-room hotel because it will attract day-trippers. On the other hand, that highway may make it possible to remove all sewage, garbage, and trash, so that the lake and its surroundings will not have to accommodate that load-and site use can increase without harm. Perhaps unauthorized traffic could be prevented with a checkpoint at the bottom of the highway, or a bus could be used to haul all users to the site. Needless to say, construction of the highway itself (if some kind of roadway does not already exist) would have an impact.

Will it be possible to design a 100-room property so it fits into the existing scenery without detracting form it? How about a 500-room property? What if the facility is a series of small villa? Can the bog be filled in or is it a protected wetland? Will its presence and that of the neighboring meadow encourage so many insects that people will be inconvenienced (and then will there be insecticide or anti-insecticide campaigns)?

If the key values derived from a site are its unspoiled vistas, views of wildlife, and being alone with nature, low levels of use will be tolerable and a 100-room property could have substantial impact. In contrast if the site is not secluded but already has considerable development, another 100 rooms probably won't have much effect.

One initiative that may aid planners at national and regional levels to better identify emerging environmental problems and to evaluate the results of their actions is the WTO Environment Committee program to develop international indicators of sustainable tourism. Begun in 1991, this initiative provides standard data on key elements of sustainability at a national level, as well as site-specific monitoring hot spots and critical ecosystems. It is expected that it can as an early warning system to reveal trends which may require timely planning or management. Hot spots are those sites of high use or rapid development that may already be showing signs of degradation, or local resistance to development. In all cases the indicators show a need for management intervention.



The uncertain promise of ecotourism

Ecotourism generally involves travel for recreational purposes under the following principles.

- Travellers visit sensitive natural and cultural environments
- Traveler's principal activities are observation, learning, and nonconsumtive and low-impact sports (canoeing, hiking) and
- Travelers desire not to disrupt local culture or ecology and where possible try to enrich the local population, rather than have tourist revenues drawn away to off- shore economies (foreign- owned chain- hotel resort).

Ecotourism appeals to those who seek to visit areas off the beaten track and to experience little- known cultures and " unspoiled" nature.

Ecotourism should:

- contribute to the conservation of the ecosystem while respecting the integrity of host communities;
- Respect the limits and opportunities afforded by the natural environment and not impact negatively on them;
- Be sensitive to the needs and wishes of host communities;
- Contribute to greater understanding of natural environments and other cultures; and
- Provide long- term benefits to host nations, regions, and communities.

Challenges to the tourism sector

- The challenges to the tourism sector are as following:
- Policy, legislation and regulation
- Protecting the resource base
- Mobilizing industry action for sustainable tourism
- Understanding the nature- resource base
- Understanding cultural values
- Measuring tourist demands and expectations
- Measuring tourism impact
- Information for better decisions
- Mobilizing appropriate technology
- Visitor management techniques and practices
- Incorporating environmental costs
- Benefiting from environmental market

Conclusion

The fact that people have become more environmentally sensitive just confirms that ecotourism will continue to be one of the fastest growing sectors of the tourism industry. The real challenge is to respond to the ecotourists demand with products that meet environmental, cultural and economically sustainable principles.



There are opinions that eco-tourists could travel and visit wilderness, untouched nature or protected area on the Earth, raising the economics of the local habitants (by living the money behind) and living the places in the same conditions as they were at the moment the tourism arrived. It seems hard to believe, hut it is possible to do. That led to knew ecotourism concept that demand complex project for every eco-tourist's destination, considering its characteristics and specifics. Such project must enable eco-tourists not just visiting and enjoying wilderness, but give some positive impact on the environment in order to protect and preserve its purity and beauty.

Considering that ecotourists differ from one another in a variety of ways it is important to marketers of the ecotourism products to understand those differences in order to plan and manage their business operations so that appropriately match markets with products.

REFERENCES:

Bricker K.S., Kerstetter, D.L. Ecotourist and ecotourism: Benefit segmentation and experience evaluation, www.ttra.com/pub/uploads/020.

Conway R. G., Barbier B. E., After The Green Revolution, Earthscan Publications LtD, London, 1999

Perman R., Ma Y., McGilvray J. Common M., Natural Resource and Environmental Economics, Pearson, Addison Wesley, 2003

Salih T. M. Sustainable Economic Development and the Environment, International Journal of Social Economics, ol. 30, no. 1/2, 2003

Tietenberg I. Environmental and Natural Resource Economics, Addison Wesley Longman Inc., 2000

Zhenhua Liu. Sustainable tourism development. a critique, Journal of sustainable tourism, Channel iew publications, Clevedon, UK, 2003



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



PRE-TREATMENT OF INDUSTRIAL WASTEWATER: ISKI'S APPROACH IN TURKEY

Ahmet SAMSUNLU

Istanbul Technical University, Faculty of Civil Engineering, Department of Environmental Engineering, Istanbul, Turkey samsunlu@itu.edu.tr

The industries whose wastewater are not allowed to be directly discharged to the sewer system, and those whose wastewater are not seen appropriate to be discharged to the sewer system due to their wastewater characterization by the authorities have to install and operate pre-treatment systems in a way so as to meet the current limits given in the Water Pollution Control Regulation and in the related local regulation.

Water supply and wastewater disposal of industries have not been properly achieved in Turkey. The limited number of regulations is not efficiently obeyed due to the inadequate infrastructure of the municipalities, inadequate number of trained technical personnel, and to political expectations. Consequently, the industries do not construct and/or postpone the pre-treatment plants required according to the Water Pollution Control Regulation.

Some local water and sewerage administrations under the Greater Metropolitan Municipalities behave more sensitively on pre-treatment requirements and in the disposal of industrial wastewater. ISKI (Istanbul Water and Sewerage Administration) is one of these organizations and it has a leading position in Turkey. ISKI has been established on 20 November 1981 under the law dated 20.11.1981 with a reference number 2560. The aims of this organization are to construct, operate and manage the services of water and sewerage systems.

The industries in Istanbul are controlled and monitored according to the 'Discharge to Sewer Systems Regulation' of ISKI that has been prepared under the light of Water Pollution Control Regulation. Those industries that do not comply with the stated limits are asked to construct their pre-treatment plants.

In this paper, information will be given about ISKI which is the oldest and the largest metropolitan infrastructure organization. Besides, the discharge of industrial wastewater to sewerage systems, pre-treatment approach, payments and applications of ISKI will be referred. Additionally, the distribution of industries among sectors, and their establishment of pre-treatment plants have been studied. The wastewater treatment methods that are used in the established treatment plants have been evaluated.

Keywords: ISKI, Discharge of industrial wastewater to sewer system, Discharge Criteria, Pre-treatment, Payments.



INTRODUCTION

The industries with inappropriate wastewater characterization and with those that are not allowed to directly discharge their influent to sewer systems by the administrations like residential site officials, municipalities, and water and sewerage authorities have to install and operate their pre-treatment plants both in developed countries and Turkey so as to comply with the limits and standards stated in the related regulations.

Water supply and wastewater discharges are regulated and monitored separately by the 16 Greater Metropolitan municipalities and 3215 municipalities. This application is found to be economically expensive, and difficulties are faced regarding their operation and maintenance (Samsunlu, 2005).

It is known that industrial activities have a major share in water pollution of Istanbul. Industries active in Istanbul constitute more than 50% of the country's overall industrial potential. Istanbul is an example of a province with a big area having scattered constructions and residential sites. The industries established within this big area are scattered around in an unplanned manner. The main sources of pollution identified in the province are due to industries, and these industries lead to great and negative impacts on the environment compared to conventional pollutants like BOD and COD (Orhon, 1991).

Even though the terminology of industrial pollution has come to the scene so late, it has recently gained interest as Turkey is at the accession stage to join EU. Istanbul is the leading province of the country in the sense of industrial pollution, however, the Water and Sewerage Administration of Greater Metropolitan Istanbul (ISKI) has set its 'Wastewater Monitoring and Control' department in 1986. The regulations on industrial pollution have been stated in 1984. At these days, the number of pretreatment wastewater treatments systems was about 5-10, this figure has increased to 1568 in year 2005.

The industrial wastewater control and related penalties are defined in the Wastewater Discharge to Sewers regulation of ISKI. In the calculation of monetary payments to be taken from the industries are formulated quite easily compared to individual formulations of each polluter system valid in Ruhrverband region of Germany.

Limited information is present on how the sludge generated from the pretreatment systems is disposed. The sludge generated from the pre-treatment systems is not controlled by ISKI.

ISKI AND ITS RESPONSIBILITIES

Water and Sewerage Administration of Istanbul (ISKI) has been established in 20.11.1981 under the law referenced as 2560 with the aim of constructing and operating any kind of water and sewerage plants in the province. In 23.05.1984 under the law referenced as 3009, the administration is joined to the Greater Metropolitan Municipality of the Province. Therefore, the mayor of the Province acts as the head of the Administrative Board of ISKI. The Administrative Board consists of a chairman and 5 members. The General Manager of ISKI and the vice manager with the maximum service period or else if the service periods are same



among the vice managers the oldest become the natural members of the Board. The rest 3 members of the Board are selected by the proposal of the Mayor of the Province under the approval of the Ministry of Interior Affairs.

The assembly of Greater Metropolitan Municipality is responsible to act as ISKI's General Board.

The activities of the Administration are limited to Greater Metropolitan boundaries. By means of the new law referenced 5216 instead of 3030, the boundaries of the Greater Metropolitan Municipality is extended up to the boundaries of the Province. The service area stated by the old and new law is shown in Figure 1. In addition to this new boundary, one district, 14 sub-districts and 173 villages are also included to the service area of ISKI. The overall area is 6504 km² with a population of 12 million.



ISKI recently operates 2 advanced wastewater treatment (3%), 4 biological wastewater treatment systems (14%), and 7 marine discharge systems with pre-treatment (83%).

In these plants, 571 million m³ of wastewater and 89 million m³ storm water has been treated in year 2005.

INDUSTRIES ESTABLISHED IN ISTANBUL

The industries and enterprises established in Istanbul have to obey the 'Discharge of Wastewater to Sewer Systems' and those industries that do not comply with the discharge limits given in Table 1 are required to construct their pre-treatment systems. The values referred in this table are prepared under the light 'Water Pollution Control Regulation'. Besides, detailed information is also given in Item 9 of this regulation on the list of materials



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

that are not allowed to be disposed into sewer lines and/or to receiving water bodies (ISKI, 2004).

In the ISKI's discharge of wastewater to sewer system has brought certain exceptions related to pre-treatment that will be explained below.

If in a wastewater collection catchment area, there exist a biological treatment system or designed, only the industrial wastewaters consisting of conventional polluting sources with COD parameter < 4000 mg/lt does not necessarily need to install a pre-treatment system prior to discharge to sewers by complying with Item 9 of the regulation.

Industrial wastewater in wastewater catchments with $< 0.5 \text{ m}^3$ /day or equal to this amount does not require individual pre-treatment. Precautions like water curtain, hammer, etc. is required. In case of no precautions taken, 'polluter pays principle' (KOP) is applied. After the allowed period if no improvements are realized, the industrial activities are ceased.

Table 2 is an operation evaluation table of industries active under the control of ISKI (ISKI, 2005). The evaluations are based on the water sample measurements.

| Parameters (mg/lt) | Values |
|--|--------|
| COD | 800 |
| Suspended matter | 350 |
| Total Nitrogen | 100 |
| Total Phosphorous | 10 |
| Oil/grease | 100 |
| Arsenic | 10 |
| Antimony | 3 |
| Tin | 5 |
| Boron | 3 |
| Cadmium | 2 |
| Total chromium | 5 |
| Copper | 5 |
| Lead | 3 |
| Nickel | 5 |
| Zinc | 10 |
| Mercury | 0.2 |
| Silver | 5 |
| Total Cyanide | 10 |
| Phenol | 10 |
| Fish Bioassay (48 hours tolerance limit) | 100% |
| Sulphate | 1700 |

Table 1. ISKI's Discharge Limits to Sewer System



In the column of 'No requirement for a wastewater treatment plant', some of the industries transporting their wastewater to another wastewater treatment plants and those that have already taken the proposed precautions by ISKI are also given. Table 3 gives information on the methodology of treatment applied on the listed industries.

| Sector | Active | Generating | With | Requiring | No requirement |
|----------------|--------|------------|------------|------------|-----------------|
| | | industrial | wastewater | wastewater | for a |
| | | wastewater | treatment | treatment | wastewater |
| | | | plant | plant | treatment plant |
| Food industry | 279 | 166 | 61 | 14 | 90 |
| Metal industry | 1831 | 760 | 540 | 90 | 225 |
| Chemical | 889 | 343 | 168 | 23 | 151 |
| industry | | | | | |
| Textile | 844 | 515 | 373 | 45 | 95 |
| industry | | | | | |
| Leather | 49 | 15 | 7 | - | 8 |
| industry | | | | | |
| Petroleum and | 1383 | 1088 | 204 | 43 | 840 |
| coal based | | | | | |
| industry | | | | | |
| Mineral | 471 | 355 | 193 | 33 | 121 |
| industry | | | | | |
| excluding | | | | | |
| metals | | | | | |
| Wood based | 110 | 23 | 9 | 32 | 14 |
| industry | | | | | |
| Others | 215 | 21 | 13 | 5 | 5 |
| TOTAL | 6071 | 3286 | 1568 | 285 | 1549 |

Table 2. Evaluation of industries and enterprises of Istanbul according to sectors

Table 3. Applied Treatment Methodology in the Industries of Istanbul

| Type of Treatment | % distribution |
|-----------------------|----------------|
| Mechanical | 14 |
| Chemical | 57 |
| Biological | 8.6 |
| Chemical + biological | 4.9 |
| Mechanical + chemical | 3.4 |
| Neutralization | 7.6 |
| Evaporation | 8.3 |



PAYMENTS OF THE INDUSTRIES

The conditions of payments required from the industrial discharges will be referred below: The effluent of the industrial wastewater is controlled by ISKI regarding the stated limits. To those industries that have already installed their treatment plants and to those that do not require installing a wastewater treatment system are identified and their 'Discharge Quality Control Licence' (DKKR) are given. The licence is valid for 3 years and must be renewed after this period.

DKKR payment = $1.5FbQK_{max}$ (TL)

is calculated by the formula given above, where

- F : flow rate factor = 2400 (constant value)
- *b* : cost coefficient = 452 YTL/m^3

This coefficient is fixed every year by the Administrative Board of ISKI. The value given here is valid for year 2006.

 K_{max} : a coefficient on pollution prevention share.

This coefficient is fixed for each sector by the Administrative Board of ISKI. The values are stated in the Annexes of 'Discharge of Wastewater to Sewer Systems' regulation of ISKI.

In the applications of the western countries, the payments of the industries are accepted as investment shares of new treatment systems and as operation and maintenance cost shares. ISKI, on the other hand, joins these to contributions in a single item and takes it from the users under 'wastewater payment' (Uslu, 1991).

The industries that have already installed their wastewater treatment plants or those that do not need to install such plants have to pay 1.5 YTL/m^3 of clean water and in addition to that amount, 1.5 YTL/m^3 for wastewater discharges.

In the regulation of ISKI, it is stated that industries with wastewater discharges above the minimum amount stated and/or with wastewater characteristics high above the discharge limits to sewer system are required to install pre-treatment systems. The industries that are required to install pre-treatment systems, or those having pre-treatment systems but not operating it, or those that have not installed the pre-treatment systems in the allowed time limit, or those that have installed the pre-treatment systems but still not complying with the stated limits have to pay pollution prevention shares $\langle OP \rangle$ till the limits are obeyed or else till the activity ceases. Same conditions hold true for those who prefer to construct septic tanks.



The formula used for various conditions of pollution prevention share is described below:

1. Pollution prevention share of those industries that have not installed their pretreatment systems:

$$KOP = TBK_{max}Q$$

where,

KOP : share of pollution prevention (YTL)

T: period for the payments (day). This period is calculated according to related items of the regulation.

- *B* : unit payment (YTL/m³) (0.2 YTL/m³) (decided by the Administrative Board)
- Q : flow rate of industrial wastewater

 K_{max} : coefficient of the share of pollution prevention payment (the coefficient is decided by the Administrative Board of ISKI under the light of all technical and scientific based calculations for the parameters of each sector or sub-sector).

Also, for the industries whose wastewater characterization cannot be done, the calculation method of the K_{max} is described in the regulation.

2. The *KOP* is calculated according to the below given formula for cases where there exist a pre-treatment or treatment system with insufficient treatment or in cases where they are not under operation:

 $KOP = 30BQK_a$

where,

Q : flow rate of the industrial wastewater (m³/day)

30~: T (time) applied average time when two sequencing analysis results do not comply with the limits (time/day)

 $K_a = (C_a - C_t) C_t$

 C_a : average concentration of two sequencing analysis results giving the maximum $\mathbf{C}_a - C_t \sum C_t$ ratio that form the basis for non-compliance (mg/lt)

 C_{t} : limit value given in the Discharge Limits to Sewer System or in the Water Pollution Control Regulation (mg/lt)

The K_a value is taken as,

 $K_a = K_a$ when $K_a < K_{a_{\max}}$ $K_a = K_{a_{\max}}$ when $K_a > K_{a_{\max}}$

 K_a and $K_{a_{max}}$ values are stated in the regulation. *KOP* cannot be taken by the evaluation of only one set of sampling analysis. The flow rate of industrial wastewater that forms the basis for KOP is defined in the regulations as well as the calculation methods. pH is the prerequisite parameter that should be satisfied. For those industries not satisfying the pH parameter are



given an extra time of 15 days to fulfil the pH requirement. If the industry still does not meet the limits by evaluating the average of the sequential analysis results, then a written notice is delivered to the industry. Moreover, if the same situation is continued for the following two sequential analysis results, the industry has to cease operation.

3. If the existing wastewater treatment is not operated due to a trouble, or if the industry directly discharges its wastewater without treatment either to the sewer system or directly to a receiving water body, an extra 2 months to recover the system is given to the industry. In case of no change in the system after the termination of the allowed time, the industry is asked to cease its operation. Till the industry recovers itself in the calculation of *KOP*, 1 is added to $K_{a_{max}}$ value.

In the annexes of the 'Discharge to Sewer System' regulation, the $K_{a_{max}}$ values for various important industrial sectors are dictated. For example, this coefficient is taken as 1 for non-alcoholic drinks industry, whereas it is taken as 5 for washing, processing of raw leather industry and for electro plating industry. In this manner, the pollution strength of wastewater is taken into account.

In Germany, in the Ruhrverband region the below mentioned formulations are considered, however this methodology is not favoured by ISKI due to its difficulty in monitoring and control.

Ruhrverband authorities have decided to follow the below given expressions for the calculation of the payments to be asked from the industries (Bode, 1998; Grunebaum 2002). In the formula not only the domestic wastewater load of 60 g/BOD₅/day is considered. The other related parameters like COD, reduced nitrogen (N_{organic} + NH₄-N), oxidized nitrogen, inorganic suspended matter (SS_{min}), and total phosphorous are also taken into account. Also, some other properties of the plant are considered. An example to that fact is considering heavy metals in metal finishing industries.

$$\begin{split} E &= 0.20Q_{a} \frac{1}{50\left(\frac{m^{3}}{a.EE}\right)} + 0.20COD \frac{1}{0.120*365\left(\frac{kg}{a.EE}\right)F} + 0.20SS_{\min} \frac{1}{0.025*365\left(\frac{kg}{a.EE}\right)} \\ &+ 0.10P_{\text{total}} \frac{1}{0.002*365\left(\frac{kg}{a.EE}\right)} + 0.15N_{\text{red}} \frac{1}{0.011*365\left(\frac{kg}{a.EE}\right)} \\ &+ 0.15 \P_{\text{red}} 0.77 + \PO_{x}N - Q_{a} 0.005 \underbrace{1}_{0.0085*365\left(\frac{kg}{a.EE}\right)} \end{split}$$

where:

- *E* : evaluation in the form of evaluation equivalents, roughly corresponding to the load caused by the domestic sewage of one inhabitant $\langle EE \rangle$
- Q_a : sewage quantity n^3/a



COD : organic substances, fixed as chemical oxygen demand $\langle g/a \rangle$ BOD_5 : organic substances, fixed as biochemical oxygen demand $\langle g/a \rangle$ SS_{min} : mineral proportion of suspended solids $\langle g/a \rangle$ P_{total} : phosphorus total $\langle g/a \rangle$ N_{red} : reduced nitrogen $\langle g/month \rangle$ NO_xN : nitrate and nitrite nitrogen $\langle g/a \rangle$

 $F (COD / BOD_5)$: correction function

 $1 < COD / BOD_{5} < 2 \quad F = 0.25 \text{(COD / BOD_{5})} + 0.5$ $2 \le COD / BOD_{5} \le 2 \quad F = 1.00$ $3 \le COD / BOD_{5} \le 11 \quad F = 0.50 \text{(COD / BOD_{5})} - 0.5$ $COD / BOD_{5} > 11 \quad F = 5.00$

The individual expenditures for wastewater and sludge treatment are assigned to the specified treatment targets and to the above given criteria. Prerequisite for this approach is a precise definition and weighting of treatment objectives as well as their translation into cost-relevant items. In principle, the most efficient tool to succeed on this route is to manage an entire catchment area and to use the resulting synergy effect [Bode and Grünebaum, 2000]. Against this background it becomes evident that it may be helpful to also evaluate cost aspects in any planned or required effort to reduce emissions. Under average conditions, the expenses for municipal sewage treatment can be assessed as substance-related variables. Accordingly, the costs incurred in German municipal sewage treatment plants may be quantified as follows [Grünebaum, 2001]:

- 4 to 8 \in per kg of eliminated nitrogen $\langle V_{total} \rangle$
- 2 to 5 \in per kg of eliminated nitrate-nitrogen $\langle V_{oxidised} \rangle$
- 8 to 20 \in per kg of eliminated phosphorus \P_{total}
- 0.2 to $1 \in \text{per kg}$ of eliminated organics, determined as chemical oxygen demand (OD)

These cost data must be added up so that a genuine monetary comparison of achieved environmental benefits - expressed as load reductions of the above listed pollutants - can be established.

Impacting variables are for one thing the conditions already outlined above, and for another in particular the specified targets with regard to the treatment performance of the wastewater treatment plant. At this point it should be noted that any effort to eliminate the 'very last milligram' of loads would increase the cost. The above listed substance-related costs comply with the European Urban Wastewater Directive for sensitive areas.



SLUDGE DISPOSAL IN ISTANBUL

ISKI has been quite successful in wastewater treatment. On the other hand, similar success has not been achieved in sludge treatment. The sludge generated in the wastewater treatment plants of Istanbul are disposed to two existing solid waste disposal landfills. The disposed amount of year 2005 was 56 593 tones. The disposal site and the disposed amounts arising from the pretreatment systems are not known and not controlled. It is assumed that part of this sludge is transferred to İzaydas, whereas the rest is disposed to illegal sites. The planned constructions of two incineration plants (Tuzla and Ambarlı) and another hazardous waste storage facility in Trakya will highly contribute to the solution of this specific problem (Samsunlu, 2006).

CONCLUSIONS

The industrial plants located in Istanbul have to effectively fully treat/partially their industrial wastewater in a way to prevent the environment from further pollution. The existing Environmental Law, and the regulations on 'Water Pollution Control', 'Discharge limits to Sewer Systems' and the 'Protection and Control of Drinking Water Catchments' state the corresponding limits. ISKI has taken under control almost all existing industrial plants in Istanbul and only there are 285 industrial plants requiring pretreatment systems.

Most of the established pretreatment systems are chemical treatment systems followed by mechanical and biological systems. The industries with efficient wastewater treatment systems and the ones that have no necessity to install treatment plants have to pay wastewater cost in the same amount as they pay for the water supply. Both water and wastewater costs are paid at the same time.

The industries that have a pretreatment system and the ones that need to install pretreatment systems have to pay KOP. ISKI has already initiated a simple and easy formulation to calculate KOP quite different from the application in western countries where each polluting parameter is considered in detail.

The disposal methods and sites of sludge arising from pretreatment systems are unknown. In order to solve this problem, ISKI has planned to construct two incineration plants and one hazardous waste disposal site in Istanbul. It is very urgent to establish these plants.

ISKI has already taken almost all the existing industries under control in Istanbul by applying the 'Discharge Limits to Sewer Systems', however, should frequently control and monitor these industries and in the long run, the discharge limits must become more stricter like in EU countries for industries like metal finishing industry whose influent highly pollutes the surface waters.

ISKI has also to rearrange its legal enforcements so as to undertake the responsibility of controlling and monitoring the influents of Organized Industrial Districts (OID). The OIDs are active according to a special law and thus, their discharges are not controllable by ISKI.



REFERENCES:

Bode, H. (1998). Einflussfaktoren auf die Kosten der Abwasser, 16 Bochumer Workshop, Schriftenreihe Siedlungswasserwirtschaft Bochum 34, Simawi, Bochum.

Bode, H. and Grünebaum, T. (2000) The cost of municipal sewage treatment – structure, origin, minimization of fair cost comparision allocation, *Water Science and Technology*, 41(9), 289-298.

Grünebaum, T. (2001) Approaches to monetary evaluation of pollutant loads in waterbodies, *IWA World Water Congress*, Berlin, October 15-19th 2001.

Grünebaum, T. (2002). Overview of International Best Practice Concerning Organizational Structure and Cost Recovery Systems for Large Wastewater Treatment Plants, *SamPraCor International Conference "Wastewater Management from a Thai Perspective"* Bangkok, 4 March 2002.

Orhon, D. (1991). Design of Pretreatment Systems, Pretreatment of Industrial Wastewaters, Turkish Committee on Water Pollution Research- Istanbul Chamber of Industry publication, Istanbul. (in Turkish).

Samsunlu, A. (2005). Regional Management Associations and Infrastructure Plants, 6th Environmental Engineering Congress, Turkish Chamber of Engineers and Architects-Environmental Engineers Publication, Ankara. (in Turkish).

Samsunlu, A (2006). Industrial Wastewater Treatment Approach of Ruhr Association from Germany and ISKI from Turkey, *Proceedings of 10th Industrial Pollution Conference*, Istanbul, July 07-09 2006 (in Turkish).

Uslu, O. (1991). Evaluation of the various proposals for 'Discharge Limits to Sewer Systems of ISKI', Turkish Committee on Water Pollution Research- Istanbul Chamber of Industry publication, Istanbul. (in Turkish).

"Environmental Law", Official Newspaper dated: 09.08.1983, Reference number: 2872.

Regulation of "Water and Sewerage Administration of Istanbul" (ISKI), 2004.

"Regulation on Urban Wastewater Treatment", Ministry of Environment and Forestry, Official Newspaper dated: 08.1.2006, Reference number: 26047.

"Water Pollution Control Regulation", Ministry of Environment and Forestry, Official Newspaper dated: 31.12.2004, Reference number: 25687.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



OLIVE OIL AND ITS EXPANSION: SUSTAINING CULTURAL VALUES BY DESIGN

L.N. Ece ARIBURUN

Istanbul Technical University, Department of Industrial Product Design Taskisla, Istanbul/TÜRKİYE ariburun@itu.edu.tr

The Mediterranean culture has an inseparable bonding with olive tree and its products. Throughout history olive derived products have been used for culinary, cosmetics, health purposes and even as a fuel (for traditional oil lamps). Cultural borders were drawn invisibly according to the growth of olive tree: "Where the olive tree disappears, the Mediterranean ends", as been described in the renowned words of George Duhamel, the French author and critic (Toussaint-Samat, 1987). Among the olive derived products, olive oil has a significant value by all its contents; it is the fat that makes a peculiar form of nourishment and cuisine possible. If, according to Faustino Cordon 'cooking made the human', then the Mediterranean human, without olive oil in the cuisine could not be understood as such (Cordon, 1988).

Mediterranean cuisine is fashionable for being credited with healthy virtues and has been taken as a reference for balanced and prudent eating, within which olive oil occupies a special position that transcends its natural framework of production (Mataix and Barbancho, 2006). According to United Nations Conference on Trade and Development (UNCTAD) data based on International Olive Oil Council (IOOC) annual reports, currently worldwide production of olive oil exceeds 2.500.000 tonnes. In 2005, Turkey was declared to be producing 5% of the world total during the last ten years. On the other hand, the consuming level in Turkey for the same era was declared as 2% of the world total (UNCTAD, 2005).

A research for European Union (EU) held in 2001⁶ about the French olive oil market clearly exposed that agricultural marketing differentiates from the general marketing with respect to the product's attributes and natural characteristics. The main scope of this paper is to focus on the marketing attributes of olive oil in Turkey, particularly by case studies among the leading brands. Product differentiation and market segmentation issues will be scrutinized in order to achieve information upon the relation between cultural heritages and brand imaging, considering product and interior designs.

Keywords: Olive oil, agricultural marketing, brand imaging, retail design.

⁶ Siskos, Y. et al., 2001. *Multicriteria Analysis in Agricultural Marketing: The Case of French Olive Oil Market*. European Journal of Operational Research 130 (2001) 315-331



1. An Exceptional Heritage: Olive Tree, "The Tree of Life"

The olive tree represents a wide assortment of natural and cultural landscapes. It is a universal symbol of peace and reconciliation, wisdom and intelligence, justice and victory. Through its geographic and historic extent it is referred as a material and spiritual reference for the Mediterranean area. Realized around a common theme, the routes of the olive tree are itineraries of sustainable development and intercultural dialogue. They consist in the rediscovery and recognition of this diverse natural heritage, linked to the technical, economic, social and cultural development of the civilizations inhabiting the Mediterranean basin since ancient times up until today. The olive tree has not only marked the landscape but also the daily life of Mediterranean civilizations; it is associated with their rites and religious traditions, and it has influenced their habits and techniques. The initiative rests on the importance of the presence of the olive tree in the Mediterranean as an element, which unifies the people who live in its environment.



Fig.1. Olive branch. (Photo reference: Fatih Pinar, 2006)

Olive tree itself is a perfect example for sustainable values, whereas it is claimed to be 'the rich tree of poor soil', by adapting easily to the climatic conditions of its environment and by having an ageing process that can last hundreds of years. Each and every part of the tree is transformed into usable or edible products. A very recent article (Uysal, 2006) demonstrates the usage of olive tree by its uttermost extents:

"Of different tastes and colors, and with the golden yellow oil extracted from its fruit, the olive is without a doubt 'an immortal tree' that pops up in symbols, myths, legends and even true stories out of the past over a broad geography encompassing many religions and civilizations. There's no doubt about it, the olive is a miracle. Forks, spoons and plates are made from its wood; from its fruit, which graces the table in many different colors, myriad kinds of oil are extracted by different processes, some of them used to make beauty soaps and shampoos; prayer beads, bracelets, and necklaces are fashioned from its seeds; its pulp is used as fertilizer or burned as fuel; its oil once lit lamps and, heated boiling hot, even became a weapon. In other words, from fruit to seed to leaf, every part of the olive tree is good for something and nothing is thrown away." The existence of the olive tree dates back to the twelfth millennium BC. The wild olive tree originates in Asia Minor where it grew in thick forests. Though there are uncertain hypotheses it is believed that the olive tree was indigenous to the entire Mediterranean basin, and Asia Minor is considered to have been the birthplace of the cultivated olive some six millennia ago. With the discovery of America (1492) olive farming spread beyond its Mediterranean confines.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

By 1560 olive groves were being cultivated in Mexico, then later in Peru, California, Chile and Argentina, where one of the plants brought over during the Conquest - the old Arauco olive tree - lives to this day. In more modern times the olive tree has continued to spread outside the Mediterranean and today is farmed in places as far removed from its origins as southern Africa, Australia, Japan and China (IOOC, 2006).



Fig.2. The origin and expansion of the olive tree (map: International Olive Oil Council)

1.1. Production, Consumption and Exportation of Olive Oil: "The Liquid Gold"

The term olive oil refers exclusively to oil obtained from the fruit of the olive tree. It excludes all other oils obtained by using solvents or re-esterification processes and of any mixture with oils of other kinds. The main organization dealing with olive oil quality standards is the International Olive Oil Council (IOOC). The standards were adopted on June 6th 1996, during the 74th IOOC Congress.



Fig.3. Olive oil (Photo taken by the author, 2005)

Olive oil, liquid gold as Homer calls it, has been more than mere food to the people of the Mediterranean: it has been an endless source of fascination and the fountain of great wealth and power. Moreover olive oil is an essential ingredient of the "Mediterranean Diet" (referring to the dietary patterns found across the basin) which is unified to traditional areas of olive cultivation in the Mediterranean region.



Presented by Professor Walter Willet during the 1993 International Conference on the Diets of the Mediterranean, held in Cambridge Massachusetts, the Mediterranean diet is valued by shaping up a vital part of the worlds' collective cultural heritage as well as its contribution to health and well-being.

Olive oil production has normally been concentrated in the Mediterranean basin countries: Spain, Italy, Greece, Tunisia, Turkey, Syria and Morocco. These seven countries alone account for 90% of world production.



Fig.4. Main producing countries in 2005 (Source: United Nations Conference on Trade and

Development (UNCTAD) based on data from International Olive Oil Council (IOOC) Main consuming countries are also the main olive oil producers as it can be seen from next graph. European Union accounts for 71% of world consumption. Mediterranean basin countries represent 77% of world consumption. Other consuming countries are United States, Canada, Australia and Japan.





International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

Fig.5. Main consuming countries in 2005 (Source: UNCTAD based on data from IOOC)

Main producing countries are also the main exporting countries as it can be seen from the map below. Once again, the Mediterranean basin countries concentrate more than 95% of total exports.



Fig.6. Exportations, average from 1988 to 2002 (Source: UNCTAD based on data from the Food and Agriculture Organization (FAO) of the United Nations.

1.2. Olive and Olive Oil Production in Turkey

The olive and olive oil sector in Turkey occupies a foremost situation in the country's agriculture, industry and trade. According to figures published by the Turkish Bureau of Statistics, the number of olive trees in Turkey are 107 million (data collected from 2004). The olive groves consist 644 hectares of agricultural land, which is approximately three percent of farmland totally. Eighty percent of the olives grown are used for oil, the other twenty percent for eating. The production is worth the value of 2.430.392 New Turkish Lira annually and the value of the marketable is 1.847.858 New Turkish Lira. The Aegean region ranks first in olive production, followed by the Mediterranean and the Marmara regions.

Turkish olives and olive oil, which are being grown and produced organically in line with foreign demand and harmonization with international standards, occupy a respected place in the foreign market. High quality virgin olive oils from Ayvalık and the Bay of Edremit are in great demand even in Italy. According to the figures of the Assembly of Exporters of Turkey, the highest rate of export growth in 2005 was in exports of olives and olive oil at over 500%. Besides the large family firms that have been in the business for years, there are also other smaller firms with a certain reputation despite limited 'boutique production'. The olives and olive oil of these firms, which are becoming better known worldwide thanks to an effective marketing strategy, simultaneously contribute to the promotion of Turkey and Turkish products (Uysal, 2006).



2. Affect of Design on Consumers in the Retail Sector

Physical aspects of retail stores have gained particular interest among the academic researchers for several decades. Interior designs of retail stores, designs of products to be sold and the graphic designs used in logos, etiquettes, etc. have been scrutinized in order to demonstrate the relationship between customer perception and store attributes.

The common base of the studies was to demonstrate the importance of the store atmosphere, whereas the term 'store atmosphere' refers to the environment that is brought by a coordinated visual display of merchandise (Ghosh, 1994). According to Berlyne (1971) the attractiveness of environmental stimuli is a function of their complexity and stimuli that are characterized by an optimal level of complexity are assumed to gain maximum interest. Thus, a recent article published in the Journal of Retailing and Consumer Services⁷ acclaims the following:

"In accordance with the conception of experience-oriented marketing a store's good condition, careful layout and relatively high information rate, all helping to bring about a pleasant store atmosphere, facilitate goal-attainment. Moreover, a pleasant store atmosphere also improves the customers' mood state."

Other components of store atmosphere, particularly music, air quality and lighting, have gained predominant interest and a vast number of studies have been made upon the subjects. Baker et al.'s (1992) study found that consumers stay longer in stores, which are high in arousing qualities probably as they are perceived as more interesting. In their study, music and lighting were combined as a single ambient factor, thus inhibiting an examination of the interaction effects between two ambient stimuli.

Today's shopping experience is increasingly defined by customers as including elements of exclusivity (unique product assortment), identification (customer's desire to identify with certain stores), interactivity (i.e. hands-on shopping or in-store services) and entertainment (Lisanti, 2000). Additionally, it should be taken under notice that consumer patronage of retail stores often extends beyond the purpose of acquiring merchandise. Consumers' visit to retail stores often takes the form of a recreational activity whose worthiness is reinforced by the level of service provision with the store (Bitner, 1992). Hence, the quality of in-store services is likely to have a strong impact on consumers' purchasing behavior (Shycon, 1992). The aim of the in-store service is to strengthen store - consumer relationship, increase consumers' pleasure of shopping in the store and encourage their repeat visits (Reynolds and Beatty, 1999).

⁷ Thang, Doreen and Tan, Benjamin, 2003.*Linking Consumer Perception to Preference of Retail Stores: an Empirical Assessment of the Multi-Attributes of Store Image*. Journal of Retailing and Consumer Services 10 (2003) 193-200



2.1. Choices upon Food Consumption

The studies have shown that food choice determinants range in scope from practical (i.e. price and convenience) and temporary reasons (i.e. mood) to sensory preferences (i.e. taste and pleasure) and personal ideals (i.e. health, weight control and ethical concerns). However, relatively less is known about the natural combinations of food choice motives among normal adults (Lindeman and Stark, 1999).

Broad segments of consumers, particularly in post-industrial societies, buy foods that are highly differentiated both intrinsically and extrinsically. Purchase decision are increasingly motivated by values, perceptions, attitudes, preferences and other subjective, extra-economic factors, and relatively less so by strictly economic variables, i.e. as income and prices. For these consumers, the demand for the attributes of healthiness, safety, naturalness, variety, convenience and image is more sensitive to variations in income than the demand for generic attributes and primary features, such as calories content, for which the income elasticity of demand is almost zero or even negative (Mili, 2004 [Senauer, 2001]).

Viewed from this perspective, olive oil responds very well to modern consumer expectations, with its high-quality image and proven gastronomic properties and health benefits. 2.2. Agricultural Marketing Strategies

To realize a research demonstrating relations involving design and olive oil consumption, Kohls and Uhl's report (1990) upon marketing strategies frequently followed by food firms could be taken under consideration as an initial point:

- a. Product differentiation, seeking to find a product's unique features which set it apart from its competitors; increasing brand loyalty,
- b. Market segmentation, concerning the development of unique product variations that will be better perceived by different consumer classes.

A research for EU (European Union) held in 2001⁸ clearly exposed that agricultural marketing differentiates from the general marketing with respect to the product's attributes and natural characteristics.

⁸ Siskos, Y. et al., 2001. *Multicriteria Analysis in Agricultural Marketing: The Case of French Olive Oil Market*. European Journal of Operational Research 130 (2001) 315-331





A framework for product development and strategy in new markets

3. Process of Research Study

Derived from the information above, olive oil and olive by-products retail "boutiques" (individual shops with distinctive brand imaging) were selected initially from various shopping guides and were classified in due to their product segment. To narrow the research, being located in the European coast of Istanbul metropolitan area was considered as a prerequisite. During the time this research primarily started, March 2005, there were only five specifically olive oil and olive related retail boutiques in the selected area. In order to perform a descriptive research by analyzing their distinct features and market segments, a survey was held through an interview and questionnaire involving the five gourmet boutiques. Each boutique's owner and/or manager answered the questionnaire under confidential protocol. The questionnaire was divided into four subdivisions regarding the information on company, product, customer profile and finally, branding and design. Sample questions from the survey included the followings:

- Description of the display and storage requirements of the products,
- Explanation of the color and material scheme used in the store,
- Portrayal of special necessities in terms of lighting and air quality (i.e. temperature and humidity),
- Decisions upon brand imaging (i.e. packaging, labeling)
- The opportunity of consumers to test the products before buying them, and if so, what kind of space arrangement is provided for this facility.



Two of the selected boutiques' owners conferred oral and written permission in order to demonstrate and publish their information. The other three owners accepted to participate under confidentiality; therefore further information is not available for publishing.

3.1. Laleli Olive Oil Store

Built up as a branch of a family company who has been in service on biological sciences, Laleli Olive and Olive Oil establishment is developed under the Research Lab of the company. The boutique was opened in 2001 and located in Bebek, the residential quarter of the high income inhabitants in Istanbul. There is another shop of the company in Ankara.



Fig. 7. Interior views from Laleli Olive Oil Store, Istanbul. (Photos taken by the author, 2005)

Due to the flawlessly circular formed interior layout of Laleli Olive Oil Store, it has a welcoming and an embracing affect at first sight. Customers enter in the symmetrical axis of the boutique, and receive certain sense of significance given to them at once. Though small in size, this circular effect strengthens the coziness and intimacy provided. Display units are symmetrically located, shelving and mobile boxes are provided. At the back of the counter table there is a small partition wall made from pumice, with an olive tree engraved on it. The color scheme is selected from tones of white to beige in order to express the natural color of olive oils, which is greenish yellow. In the middle of the boutique there is a lacquer painted wooden table were customers can try the products, and above this table there is a fixture made of several small glass bottles filled with olive oil. This remarkably decorative fixture was originated from the idea of oil-lamps in mosques, and it could be said that it has become the center of attention in the boutique. The scent of olive is most likely to be the unique feature of Laleli Olive Oil Store. As customers enter in the circular plan of the boutique, they have to pass closely to the displays were various products derived from olive are placed. This close encounter enables to feel the pleasant scent as much as possible. Relations between scents and shopping have been an interesting subject for researchers, i.e. a previous study developed a conceptual model portraying ambient scent as an environmental cue that influences emotional responses and ultimately shopping behaviors (Gulas and Bloch., 1995).



3.2. Kürşat Olive Oil Boutique

Held by a family company which has been dealing with olive and its by-products for almost a century, Kürşat Olive Oil Boutique was recently opened in Istanbul (2004). The company has three other branches in different cities all in the agricultural trade area of olive, olive oil, dried tomato, capari and green pepper grown in their own groves and farms.

Kürşat Olive Oil Boutique is located in Nişantaşı, the fashionable area of the city. Though it is relatively small by means of scale, a luminous and spacious atmosphere has been created with the professional help of an interior design company. There is a big singular piece of display unit (shelving system) where all the various types of olive oils with attractive packaging are exhibited. Natural soaps made from olive oil, domestic tools made from olive wood (soap holders, trays and mats), other kinds of agricultural products such as dried tomatoes and capari are secondarily put on view on the extension of this big display unit. The diffused lighting fixtures installed in the boutique enhance the clarity and purity of the olive oils, while revealing a spacious and contemporary sensation.



Fig.8. Product views from Kürşat Olive Oil Boutique, Istanbul. (Photos taken by the author, 2005)

The distinctive quality of Kürşat Olive Oil Boutique is the reference it gives to the Mediterranean disposition: All interior design is composed of curves and there is no straight lines viewed. This aspect directly relates to the Mediterranean waves and the idea of hospitality. Traces of olive form communicate through the display, lighting, seating units and the counter-table, together generating a pleasant and familiar atmosphere. The pictures of the family members of the company who held the business for decades are in sight of the customers, as a reminiscence of traditional values and family ties. Past studies have indicated that in order to induce pleasure, store characteristics should remind customers of other positive experiences (Spies et al., 1997). Kürşat Olive Oil Boutique reminds local and cultural qualities in this sense. In sum, it can be supposed that Kürşat Olive Oil Boutique bonds 'uniqueness' in its atmosphere by the quality of design character.



4. Conclusions and Limitations

Depending on the research described in this paper, it is possible to declare that agricultural retail shops or 'boutiques' have a propensity to create a more diversifying quality than regular retail shops. Store atmosphere in terms of harmonizing design character, layout, lighting, color, air quality and music have an effect on the in-store behavior of the customer, and therefore present a 'unique' shopping experience.

This study points out to the case of olive oil retail shops, and partially demonstrates the influence of distinctive qualities of this valuable agricultural product on the design of the boutique. As previously discussed, one of the major features of creating a pleasant store atmosphere is the layout of the boutique, which is mostly formed with display and storage units. Olive oil has certain requirements for proper storage and exhibition facilities. To retain its properties it must be kept away from excess heat, air, damp and above all, from excess light. All these variables have a tendency which affects the design limitations of display units and storage areas. Regarding the selected stores portrayed in this study, it could also be said that products have an affect on the color scheme used in the interiors: Pale colors and light tones of hues are dominant in the olive oil boutiques. The relation between cultural values of each product and the store atmosphere can also be sensed through the store atmosphere: the rich Mediterranean identity surpasses any other concept. Olive oil stores tend to use 'contemporary, energetic, vivacious', to depict their environment.

The selected case studies in this research occupy a segment of the distribution sector that is differentiated on the basis of the sale of attractively presented; top-range products (i.e. organic oils, flavored oils). Oils produced and packed by small or medium-sized specialty firms may have a place on the market at middling or high prices in this segment, and their oils are differentiated by their characteristics from more price-competitive products. For this strategy to be successful it is very important to ensure that the product attributes, package design and labeling closely meet the specific needs of the end customer, who is often sophisticated and very demanding (Mili, 2004). Indeed; recreating distinct brand identity in olive oil retail boutiques, products and packaging, purchasing points, web sites and other communicative media is an essential value added by design. In order to sustain such a prominent Mediterranean cultural value, olive oil, design policies of companies are practically as important as governmental agriculture policies.

Another interesting result obtained from this research is, even though Turkey is among the leading countries in producing and consuming olive oil, the greater part of consumers were not aware of the differences between the various marketable types of olive oil, nor are they familiar with the description and properties of each one. Thus it would appear necessary to intensify information campaigns targeted at existing and potential consumers, nationally and internationally, in order to supply them with clarifying information on the characteristics, benefits and uses of different olive oils.



Product certification is a further crucial aspect for promotion processes. A large number of distributors require suppliers to have oil quality and the oil production process certified by an accredited certification body. The promotional advantage lies in displaying quality certifications (usually generic cues) enabling the companies concerned to benefit from joint promotional activities at the international market (Mili, 2004).

Finally, it should be taken under consideration that the limitations of this study is it has investigated in a specific region (European coast of Istanbul, Turkey) and therefore cannot act as a global guide for olive oil and olive by-products boutique design.

REFERENCES:

- BAKER, J., LEVY, M., and GREWAL, D. (1992). "An Experimental Approach to Making Retail Store Environmental Decisions", Journal of Retailing 68 (4), 445-460.
- BERLYNE, D.E. (1971). "Aesthetics and Psychobiology", New York: Meredith Corporation.
- BITNER, M.J. (1992). "Servicescapes: The Impact of Physical Surroundings on Customers and Employees", Journal of Marketing 56 (April), 57-71.
- CORDON, F. (1988). "Cocinar Hizo Al Hombre" ("Cooking is the making of Man"), Tusquets: Spain.
- D'AUREA R. and FACENDOLA M. (2003). "The olive oil sector in Italy", Olivae, 98, p. 8-19.
- GHOSH, A., (1994). "Retail Management", 2nd Edition. Chicago, IL: The Dryden Press.
- GULAS, C.S. and BLOCH, P.H. (1995). "Right Under our Noses: Ambient Scent and Consumer Responses", Journal of Business and Psychology 10 (Fall), 87-98.
- KOHLS, L.R. and UHL, N.J. (1990). "Marketing of Agricultural Products", 7th Edition. New York: Mac Millan.
- LINDEMAN, M. and STARK, K. (1999). "Pleasure, Pursuit of Health or Negotiation of Identity? Personality Correlates of Food Choice Motives Among Young and Middle-aged Women", Appetite 33, 141-161.
- LISANTI, T. (2000). "Today's Customer is redefining the Shopping Experience", DSN Retail Today 39 (September), 11.
- LOUMOU A. and GIOURGA C. (2003), "Olive groves: The life and identity of the Mediterranean", Agriculture and Human Values, 20 (1), p. 87-95.
- MATAIX, J. and BARBANCHO, F.J. (2006). "Olive Oil in Mediterranean Food", Olive Oil and Health, 1-36, edited by Jose L. Quiles et al, CAB International, UK.
- MILI S. (1999), "The olive oil sector: International challenges and future scenarios", Olivae, 75, p. 8-16.
- MILI, S. (2004). "Prospects for Olive Oil Marketing in Non-Traditional Markets", AIEA2 International Conference "Sustainable Development and Globalisation of Agri-Food Markets" Laval University, Québec, Canada.
- REYNOLDS, K.E. and BEATTY, S.E. (1999). "Relationship Customer Typology", Journal of Retailing 75 (4), 509-523.



- SHYCON, H.N. (1992). "Improved Customer Service: Measuring the Payoff", Journal of Business Strategy 13, 13-17.
- SISKOS, Y., MATSATSINIS, N.F. and BAOURAKIS, G. (2001), "Multicriteria Analysis in Agricultural Marketing: The Case of French Olive Oil Market", European Journal of Operational Research 130, 315-331.
- SPIES, K., HESSE, F., and LOESCH, K. (1997). "Store Atmosphere, Mood and Purchasing Behavior", Journal of Research in Marketing 14, 1-17.
- TAN, S. And KÖKSAL, H. (2004), "Sürdürülebilir Tarım", Tarımsal Ekonomi Araştırma Enstitüsü TEAE Bakış, Sayı 5 Nüsha 2, Nisan 2004.
- THANG, D.C.L. and TAN, B.L.B. (2003), "Linking Consumer Perception to Preference of Retail Stores: An Empirical Assessment of the Multi-Attributes of Store Image", Journal of Retailing and Consumer Services 10, 193-200.
- TOUSSAINT-SAMAT, M. (1987). "A History of Food", Cambridge MA, Blackwell Reference, 1993. [Translation of "Histoire naturelle & morale de la nourriture", 1987].
- TUNALIOĞLU, R. (2002), "Zeytinyağı", Tarımsal Ekonomi Araştırma Enstitüsü TEAE Bakış, Sayı 1 Nüsha 4, Aralık 2002.
- UYSAL, L. (2006). "Olive", Skylife, October 2006.

Web References:

IOOC - International Olive Oil Council, www.internationaloliveoil.org (Date accessed: Multiple entrees in July, August and September 2006)

UNCTAD – United Nations Conference on Trade and Development, www.unctad.org (Date accessed: 17.07.2006 to the following page: http://r0.unctad.org/infocomm/anglais/olive/market.html)

TURKSTAT – Turkish National Statistical Institute, www.turkstat.gov.tr (Date accessed: Multiple entrees in September 2006)



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



ADMINISTRATIVE, MANAGEMENT AND ECONOMICAL EVALUATION OF MUNICIPAL SOLID WASTE COLLECTION SERVICES AND RECYCLING ACTIVITIES IN ISTANBUL METROPOLITAN

D. KARADAG*, S.SAKAR, H.BAYHAN

Yildiz Technical University, Department of Environmental Engineering, Istanbul, Turkey dkaradag@yildiz.edu.tr,sakar@yildiz.edu.tr,hbayhan@yildiz.edu.tr

Istanbul is most populated city of Turkey and it is major metropolitan of the world. Rising of population and economical activities increases the importance of waste management in Istanbul. Information about municipal solid waste collection and recycling programs was collected from the local authorities and evaluated according to administrative and economical aspects. The main problems of waste collection are separation of management activities between local authorities and lack of coordination in management activities. Private sector participation in solid waste collection services helps to lower costs and increase the productivity of services but duration of contract is inadequate to raise the cost recovery rate of tax. Recycling rate of waste is insufficient because of many administrative and economical handicaps.Optimal solution for recycling is separation at source and including the scavengers into waste management program.

Keywords :Istanbul; municipal solid waste; administrative structure; collection; recycling

1. Introduction

The management of the growing quantities of solid wastes is a very important global environmental issue and it is the major responsibilities of local governments. Municipal solid waste (MSW) is defined to include refuse from households, non-hazardous solid waste from industrial, commercial and institutional establishments, yard waste, and street sweepings (Schüleber *et al.*1996). In developing countries, rapid urbanization has been one of the contributory factors to the problem of waste disposal because the amount of solid waste increases with urbanization, leading to adverse effects on human health and the environment (Tolb *et al.*1992). Communities worldwide are facing increased difficulties in managing their municipal solid waste effectively and economically (Najm *et al.*2003).

Municipal solid waste management contains technical and social aspects. Technical aspects are concerned with the planning, implementation and maintenance of collection, transfer recycling and systems, waste recovery and final treatment systems. Social aspects include the patterns of waste generation, community-based waste management and the social conditions of waste workers (Schüleber *et al.*1996). Authorities in charge of waste management must include all aspects into strategies to achieve sustainable and effective waste management which have socially desirable and environmentally sound manners.



Istanbul is Turkey's largest city and it is also one of the most crowded metropolises in the world with a population over 10 million. The city has great attraction as it is center of industrial, commercial and educational activities, and rising of population has lead to increase waste collection and recycling. Municipal solid waste in Istanbul has local problems and these problems can be treated with local management solutions in accordance with national regulations and strategy. In this study, local authorities were asked information about the collection and recycling programs and the regulations concerned with administrative structure of waste management were examined. Information obtained from local officials and regulations is explained and evaluated according to its administrative and economical aspects, and some proposals are offered to increase the effectiveness of the waste management and recycling program.

2. Municipal solid waste characteristics

Generation of MSW is dependent on many parameters such as population, economic development, consumption rate of individuals, geographic location, and administrative systems, and population and economic conditions are the two most important factors contributing to the quantity of MSW (Wang and Nie 2003).

Waste generation rates and population density for some districts in Istanbul is given in Table 1. Population rates were calculated from the results of population census for 2000 (DIE 2001) and waste percent were calculated according to records of trucks entering transfer stations. Table 1 shows a general correlation between waste and population rates. Main industrial and commercial activities are crowed in Eminonu, Kadikoy, Bahcelievler, Besiktas and Beyoglu districts, and waste generation rate of these districts are higher than population. According to these figures, intense of industrial and commercial activities are major factor of waste generation in Istanbul.



Figure 1. Amount of municipal solid waste in Istanbul



Amount of waste generated in Istanbul as a function of time is shown in Fig. 1. As can be seen from the figure amount of waste generated in the city has increased gradually. Approximately 3.5 millions tons of waste per year is being produced in Istanbul (Demir *et al.*2004) and total amount in 2020 was projected to reach 4.75 millions of tons (Curi and Kocasoy 1998). The values in Table 2 reflect that organic materials are the main fraction of from 19.5 % in 1996 to mean value in 10 % in 2004. It is evident from Table 2 that increasing of living standards of people changed consumption patterns. While rates of diaper, metal, textile and glass increased between 1996 and 2004, ash content of waste decreased significantly. The main reason for this reduction is increasing of natural gas consumption instead of coal. These changes are well agreement with the results of World Bank research (WB 1999) in which amount and composition of waste changes with increasing population and shifting of consumption patterns, respectively.

| Table 11 optiation and waste generation rates of district municipanties | | | | | |
|---|------------|---------|------------|------------|---------|
| District | Population | Waste | District | Population | Waste |
| | percent | percent | | percent | percent |
| Kadikoy | 6.57 | 7.31 | Eminonu | 0.55 | 3.36 |
| Bahcelievler | 4.69 | 5.67 | Besiktas | 1.90 | 3.29 |
| K.Cekmece | 5.85 | 5.14 | Pendik | 3.80 | 3.09 |
| G.Osmapasa | 7.59 | 5.02 | Esenler | 3.92 | 2.86 |
| Uskudar | 4.93 | 4.79 | Bayrampasa | 2.45 | 2.45 |
| Bagcilar | 5.56 | 4.70 | Eyup | 2.53 | 2.37 |
| Umraniye | 6.16 | 4.30 | Avcilar | 2.33 | 1.84 |
| Beyoglu | 2.33 | 3.72 | Sariyer | 2.42 | 1.75 |

 Table 1 Population and waste generation rates of district municipalities

Table 2 Solid waste composition in Istanbul (Weight, %)

| | Arikan, 1996 | Demir et al. ,2004 | | |
|---------------|--------------|--------------------|--|--|
| Organics | 48.0 | 40.6-45.3 | | |
| Paper | 8.4 | 2.5-10.6 | | |
| Plastic | 11.0 | 1.7-8.5 | | |
| Glass | 4.6 | 4.1-9.1 | | |
| Textile | 2.9 | 4.6-6.1 | | |
| Metal | 2.3 | 2.7-8.0 | | |
| Diaper | 3.2 | 7.0-12.4 | | |
| Ash and other | 19.5 | 6.0-12.1 | | |

2. Administrative structure

In the administrative frame, Istanbul has 32 district municipalities and a Metropolitan Municipality. National solid waste control regulation sets the duties of local authorities. According to the regulation, collection and transportation of MSW to transfer stations and street sweeping are responsibility of district municipalities. Metropolitan Municipality is charged for the transfer and final treatment of wastes.



For these purposes Metropolitan Municipalities constructed six transfer stations, two sanitary landfills in 1995, a recycling and composting plant in 2001, and construction of three transfer stations were included for future plan. Location of municipal solid waste management plants in Istanbul in Istanbul is shown in Fig.2 (Berkun *et al.*2005).



Figure 2 Location of municipal solid waste plants in Istanbul (Berkun et al., 2005

Municipal solid waste collection services are managed by cleansing department of each district department. Environmental departments of district municipalities deal with waste recycling and other environmental activities. Separation of waste management activities either between two departments in a municipality and between district and metropolitan municipalities decreases the management productivity. Inclusion of two different local authorities for the waste collection and final disposal services lead to lack of coordination between officials, and recycling has latest level of significance in the waste management programs of each local governments. In order to increase the performance of MSW management, collection, transfer and final disposal activities should be performed under the same management structure, for example by metropolitan municipality, and recycling must include on the top of the waste hierarchy.

4. Management of MSW collection services

Most district municipalities perform collection services of municipal solid waste with the personnel of contractors and some municipalities perform with public workers. In both case, all services are supervised by an official manager. Collections programs are planned according to experiences of officials and there is a lack of a document involving managements program or designing scheme of collection programs. Problems are solved with the coordination experienced local officials and contractor. There is no training program for selecting and employing workers both in private and public sectors.


Municipal solid waste collection in Istanbul is based on the communal bin system. Residents are required to bring their waste to bins at a designated time. Communal storage bins are collected by compactor trucks of private firms and/or district municipality. Communal bins are provided by local authority in the central areas of each district. In some parts of districts there is a lack of communal container and waste bags are accumulated on the street. Collecting of waste from street instead of communal bins increases the pick-up points, decreases the efficiency and raises the collection cost. Dijkgraaf and Gradus (2003) stated that the number of pick-up points has a significant impact on the total collection cost and higher pick-up frequency in Netherlands increased the costs about 19 %.

The main problem of MSW collection in Istanbul is that waste is brought before the designated time and accumulating of waste cause heaps of garbage on the streets. Especially in summer times, these heaps decay rapidly because of high organic content and pose a health treat to residents.

After the hauling of collected waste to transfer stations, management activities are occupied by metropolitan municipality. In the transfer stations, wastes are emptied into vertical silos and volume is reduced about 30 % with compacting (Tuyluoglu *et al.*1999). Compacted waste is transported with silos to sanitary disposal sites.

5. Economics of MSW collection services

Most district municipalities turned over solid waste collection services to private sector because of labor strike and higher labor costs. Privatization of the MSW services in Istanbul is carried out by the contract method and the firm with lowest bidder is awarded. The duration of contract is one year and the payment is done monthly by the local authorities. Private firms desire to gain maximum profits in the duration of contract in order to depreciate capital expenditures for their investment and this is a handicap for local governments to get lower collection cost. In order to achieve lower cost by privatization, length of contract should be higher than one year. Countira -Levine (1994) stated that duration should be longer than 4 years to have lowest costs.

Workers in private sector are employed with minimum wage and receive less social benefits than public sector. Also workers of private firms are lack of protection by labor unions. Cointtreau-Levine (2000) stated that lower standards of working conditions limit productivity of workers. These poor working conditions, also, increase the frequency of employment changing and decrease the number of younger and qualified person in waste collection services.

Environmental Cleansing Tax (ECT) was introduced in 1994 to obtain revenue for financing the MSW services and it is assigned to buildings. ECT is collected by district municipalities and the 10 % of revenue is distributed to National Environmental Pollution Control Fund, 20 % to metropolitan municipality and 70 % to district municipality.



ECT has a flat rate system and fee is determined with respect to the area occupied by the buildings and the amount of waste produced is not considered. Collection rate of ECT is shown in Fig. 3. While the collection rate of WT was 85 % in 1994, it has decreased gradually and the rate was 62 % in 2003. Collected tax covered the 30 % of collected cost in 2001 and remaining expenditures were met by other sources of municipal budget. Privatization of solid waste services lowered collection costs and increased cost recovery rate of tax, so that the economical resources of municipalities were utilized more efficiently.

Present tax system is inadequate to cover the MSW management costs and to decrease the fiscal pressure on local budgets. Flat fee system is unsound from both an economic and an environmental perspective (Scot and Janet 1999) and is inadequate to cover the MSW management costs and decrease the fiscal pressure on local budgets.



Figure 3 Environmental cleansing tax collection rate per year

7. Recycling activities

Recycling reduces the amount of disposable waste and energy consumption, increases the life span of disposal sites, decreases the gas emissions generated in landfill, generates employment opportunities, improves ecological quality and lower collection costs (Deniso 1996, Craighill and Powell 1995, Weithz *et al.*2002). For Istanbul, recyclable waste in municipal waste is about 30 to 40 % for Istanbul (Toroz and Arikan 1999). Recycling activities in Istanbul have been performed since 1950s to recover materials having economical value such as glass and paper (Metin *et al.*2003) but Turkey is one of fewer countries which has the lowest recycling rates in OECD (OECD 2004).



Waste management activities are divided between district and metropolitan municipalities, and recycling activities are being performed by discrete local authorities at different scales. For example, metropolitan municipality has operated a recycling and composting plant for five years. In this plant about 1000 tones wastes per day are separated manually, 100 tones of valuable materials are recovered and 250 tones of compost is produced from the organic materials in wastes.

The main negative factor effecting recycling efforts is originating from division of duties in administrative structure. Since district municipalities are not responsible for the final disposal of wastes, generally recycling is not included in their waste management programs. To increase rate of recycling rate, all local authorities should have collective strategy, furthermore technical and economical resources must be utilized cooperatively and recycling should be located on the top of waste hierarchy.

The other handicap for the recycling activities is the distribution of MSW services between two departments in a same municipality. Recycling activities are carried out by Environmental Department and Cleansing Department deals with collection of waste.

Environmental department has inadequate technical, economical and human resources and personnel have deficient know-how about recycling. The budget of recycling activities is inadequate for recovering of expenses and after economical crisis in 2001 almost all recycling programs of district municipalities have been terminated. All waste management services should be performed by only one department to increase the recycling performance.

Tax system is another difficulty for recycling activities. Present situation which not considers volume and composition of waste does not motivate people recycling, separation at source and decreasing the amount waste. Taxation of the municipal solid waste services according to volume or weight decreases the amount of waste (WB 1999) and improves recycling performance (Thomas and Bartelings 1999). Scavengers are main actor in recycling activities but they are not organized and integrated into the official waste management program. Public participation and awareness is an important issue in recycling activities. In Istanbul, the level of environmental awareness and knowledge of people is relatively low. People regard the municipal solid waste as a matter of getting rid of things that were unwanted and has no economical value. People should be educated to improve the sensitization about the reusing, recycling, separating at source and reducing the waste amount

In present situation, most favorable recycling method in Istanbul is the collection of recyclable materials by scavengers after the separating the wastes at source. Scavengers should be organized by officials, integrated into the waste management program and also supported economically.



8. Conclusions

In this study, management of municipal solid waste collection and recycling programs is evaluated according to economical and administrative aspects. Main problem of waste management in Istanbul is caused by failure of coordination and integration between local authorities. Separation of waste management activities either between two departments in the same municipalities and between district and metropolitan municipalities led to lack of coordination in waste management activities. Combining all waste services within the same management structure and including the social aspects will improve quality of services.

Private sector participation in solid waste collection services lower expenses, raises the cost recovery rate of tax and increases the productivity of services but duration of contract is one year and inadequate for private firms to depreciate capital expenditures and this a handicap for reducing the costs. In order to gain maximum efficiency, tax system should be changed from flat fee than unit pricing.

Recycling rate of waste in Istanbul is insufficient which is caused by many administrative and economical factors and lack of public participation. Optimal solution for recycling is separation at source and collection by scavengers.

REFERENCES:

- Berkun, M., Aras, E. and Nemlioglu, S., Disposal of solid waste in Istanbul and along the Black Sea coast of Turkey. *Waste Management*, 2005, 28, 847-855.
- Cointreau-Levine S, Private sector participation in municipal solid waste services in developing countries, Volume:1, World Bank Urban Management Program, 1994
- Cointreau-Levine S. Occupational and Environmental Issues of Solid Waste Management: Special Emphasis on Developing Countries' 2000, Available at
- http://www.integracionxxi.net.uy/medioambiente/Cointreau2.doc)
- Craighill, A. L. and Powell, J. C., Lifecycle assessment and economic evaluation of recycling: A case study, 1995 (Working Paper of University of East Anglia and University College London)WM 95-05
- Curi,K. and Kocasoy, G. National Environmental Action Plan, (TBMM Press, Ankara 1998) (in Turkish).
- Demir, A., Bilgili, M.S. and Ozkaya, B., Effect of leachate recirculation on refuse decomposition rates at landfill site: a case study. *Int. J. Environment and Pollution*, 2004, 21,175-180.
- Deniso, R., Environmental life-cycle comparisons of recycling, landfilling, and incineration: A review of recent studies. *Annu. Rev. Energy Environ.* 1996, 21 191-237
- DIE, Results of population census (State Institute of Statistics, Ankara) 2001.
- Dijkgraaf, E. and Gradus, R., Cost Savings of Contracting Out Refuse Collection. *Empirica*, 2003, 30,149–161.
- Metin, E., Erozturk, A. and Neyim, C., Solid waste management practices and review of recovery and recycling operations in Turkey. *Waste Management*, 2003, 23, 425–432.



- Najm, M., El-Fadel, A., Ayoub, G., El-Taha M. Amd Al-Awar, F., An optimisation model for regional integrated solid waste management I. Model formulation, *Waste Management* and Research, 2003, 20, 37–45.
- OECD, Adressing the economics of waste No:53387 (OECD Publications, France) 2004
- Schübeler, P., Karl, W. and Jürg C, Conceptual Framework for Municipal Solid Waste Management in Low-Income Countries. Urban Management Programme Working Paper, (World Bank, No. 9. 1996).
- Scott, J. C. and Janet, M. T., Adopting a Unit Pricing System for Municipal Solid Waste: Policy and Socio-Economic Determinant. *Environmental and Resource Economics*, 1999, 14, 503–518.
- Thomas, S. and Bartelings, H., Household Waste Management in a Swedish Municipality: Determinants of Waste Disposal, Recycling and Composting. *Environmental and Resource Economics*, 1999, 13, 473–491.
- Tolb, K.M, El-Kholy, O. and El-Hinnani, A. The World Environment: Two Decades of Challenge.(Chapman and Hall, London. 1992).
- Toroz I, Arikan O, Istanbul'da kati atiklarin geri kazaniminin incelenmesi, Presented at the conference of Kent Yonetimi Insan ve Cevre Sorunlari Sempozyumu, 1999, Istanbul, (in Turkish)
- Tuyluoglu, B.T., Yildiz, S. and Iskenderoglu, A.U., Istanbul'da kati atik yönetimi ve bertaraf uygulamalari, Presented at the conference of Kent Yonetimi Insan ve Cevre Sorunları Sempozyumu, 1999, Istanbul) (in Turkish).
- Wang, H. and Nie, Y., Municipal Solid Waste Characteristics and Management in China. Journal of the Air & Waste Management, 2001, 51, 250-263.
- WB, What a Waste: Solid Waste Management in Asia (World Bank Press, Washington) 1999
- Weitz, K. A., Thorneloe, S. A., Nishtala, S. R., Yarkosky, A. and Zannes, M., The Impact of Municipal Solid Waste Management on Greenhouse Gas Emissions in the United States. *Journal of the Air & Waste Management*, 2002, 52, 000-1011.





THE GREEN BUILDING INDUSTRY

Suat GÜNHAN

Izmir University of Economics, Department of Architecture, Izmir, TURKEY suat.gunhan@izmirekonomi.edu.tr

Buildings are responsible for a considerable amount of the world's energy and hence carbon dioxide emissions, the design, construction and operation of buildings is vitally important for people now and in the future. As a result of this situation, green building is becoming an important and scientifically backed international initiative that is starting to profoundly change the way architects, developers, owners, engineers, interior and landscape designers must design and build. The objective of this study is to evaluate the progress of Green Building projects in the United States. What do owners think of these buildings? Is it worth to build them? Do they financially make sense? What are the benefits for people, for natural environment? The paper explores sustainable development, design and construction concepts in order to understand the Green building concept. Some of the important findings from the Green Building survey performed by a major U.S. Construction Company in the United States were presented. The findings indicate that the Green buildings have major existence in government projects (other than educational facilities). Cost benefits coming from the energy efficiency could be the major reason for owners to prefer green buildings. Reduced absenteeism, improved health conditions, well being of employees and consequent increased productivity provides indirect cost benefits for owners. The findings also indicate that green educational facilities increase students' success in tests and reduce their absenteeism. Besides all the benefits, the lack of awareness of green buildings creates a major obstacle in the spread of these buildings. Owners are not very familiar with these buildings and the associated cost benefits over the life cycle of buildings.

INTRODUCTION

Green building is becoming an important and scientifically backed international initiative that is starting to profoundly change the way architects, developers, owners, engineers, interior and landscape designers must design and build. In fact, green building is changing the entire process for building design [1].

There has been increased interest over the last several years in constructing Green buildings to the enormous impact on the environment of the 76 million residential buildings and nearly five million commercial buildings currently existing in the United States. Collectively, buildings are estimated to consume 37% of all energy used in the United States, including 68% of all electricity, 88% of potable water supplies, and 40% of raw materials. In addition, buildings generate more than one-third of municipal solid waste streams in the United States and 36% of total emissions of anthropogenic carbon dioxide emissions, the primary greenhouse gas associated with global climate change [2]. Since buildings are responsible for a considerable amount of the nation's energy and hence carbon dioxide emissions, the design, construction and operation of buildings is vitally important for people now and in the future [3].



The U.S. Green Building Council launched the Leadership in Energy and Environmental Design (LEED) assessment tool in 1998 (post-Kyoto) to establish a common standard of measurement for green buildings. Its secondary purpose is to promote integrated, whole building design processes and stimulate competition in the environmental building market. Proponents of LEED also hope that the rating system will make consumers more aware of the benefits of environmental building. Buildings are awarded silver, gold and platinum medals based on their sustainable design qualifications [1].

LEED Green Building Rating System is the nationally accepted benchmark for the design, construction, and operation of high performance green buildings. LEED gives building owners and operators the tools they need to have an immediate and measurable impact on their buildings' performance. LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality [4].

LEED is a green-building rating system that includes mandatory requirements for factors such as energy and water efficiency. The rating system awards additional points for criteria in six categories. In addition to five categories mentioned in the previous paragraph, additional points are also awarded for innovation and design process. The resulting point total determines a building's final rating. For new construction projects, basic certification is awarded for buildings scoring 26 to 32 points. Higher certification levels include LEED Silver (33 to 38 points), LEED Gold (39 to 51 points), and LEED Platinum (52 to 69 points) [5].

The first LEED certified building the Kandalama Hotel in Sri Lanka was constructed in 1994 and was followed shortly after by the Energy Resource Center in Downey California, in 1995 [1].

The objective of this study is to evaluate the progress of Green Building projects in the United States. What do owners think of these buildings? Is it worth to build them? Do they financially make sense? What are the benefits for people, for natural environment? The paper explores sustainable development, design and construction concepts in order to understand the Green building concept. Some of the important findings from the Green Building survey performed by a major U.S. Construction Company in the United States were presented. The survey highlights the major trends in the United States including the role of LEED which has a major role in the growth of Green Buildings in recent years. Recommendations and conclusions that pertain to Green Buildings are presented at the end of the paper.

SUSTAINABLE BUILDINGS: GREEN BUILDINGS

Sustainable development is development which meets the needs of the present without compromising the ability of future generation to meet their own needs. The word development in this definition implicates two important aspects of the concept: It is omnidsciplinary, it cannot be limited to a number of disciplines or areas, but it is applicable to the whole world and everyone and everything on it, now and in the future [6].



The built environment is affected by the environmental issues and the built environment affects the environment. Built environment is a major element affecting the sustainability of the natural environment.

A green approach to the built environment involves a holistic approach to the design of buildings. All the resources that go into a building; materials, fuels or the contribution of the users need to be considered if a sustainable architecture is to be produced. Producing green buildings involves resolving many conflicting issues and requirements. Each design decision has environmental implications. Measures for green buildings can be divided into four areas:

- Reducing energy in use
- Minimizing external pollution and environmental damage
- Reducing embodied energy and resource depletion
- Minimizing internal pollution and damage to health

Green buildings involve considering the whole life of buildings, taking environmental quality, functional quality and future values into account. Sustainable building design is therefore the thoughtful integration of architecture with electrical, mechanical and structural engineering resources. In addition to express concern for the traditional aesthetics of massing, orientation, proportion scale, texture, shadow and light, the facility design team needs to be concerned with long-term costs: environmental, economic and human [3].

Green buildings should emphasize an integrated approach to design which includes all members of the team around the table from the planning stage onward. Integrated design is promoted as a way of designing more fully functioning, holistic buildings. Sustainable design is not a passing trend. Increasing number of cities, government organizations and universities are mandating construction to meet or exceed LEED benchmarks [1]. Construction materials used throughout a green building are selected to better protect human health and the environment, plus include locally made materials whenever possible. Green buildings also offer significant energy – and water – efficiency improvements, which drastically reduce the costs of operating and maintaining each structure [5].

Sustainable construction is defined as "the creation and responsible management of a healthy built environment based on resource efficient and ecological principals. Sustainably designed buildings aim to lessen their impact on our environment through energy and resource efficiency. It includes the following principals:

Minimizing non-renewable resource consumption Enhancing the natural environment Eliminating or minimizing the use of toxins.



Green buildings can be defined as those buildings that have minimum adverse impacts on the built environment, in terms of the buildings themselves, their immediate surroundings and the broader regional and global setting. Green building may be defined as building practices, which strive for integral quality (including economic, social and environmental performance) in a very broad way. Thus the rational use of natural resources and appropriate management of the building stock will contribute to saving scarce resources, reducing energy consumption (energy conservation), and improving environmental quality [6].

A green building places a high priority on health, environmental and resource conservation performance over its life-cycle. These new priorities expand and complement the classical building design concerns: economy, utility, durability, and delight. Green design emphasizes a number of new environmental, resource and occupant health concerns [6]:

- Reduce human exposure to noxious materials
- Conserve non-renewable energy and scarce materials
- Minimize life-cycle ecological impact of energy and materials used.
- Use renewable energy and materials that are sustainably harvested.
- Protect and restore local air, water, soils flora and fauna.
- Support pedestrians, bicycles, mass transit and other alternatives to fossil-fueled vehicles.

CASE STUDY: LEADING U.S. CONSTRUCTION COMPANY'S SURVEY

The results of the survey conducted by Turner Construction prove that green building movement is on its way. The company surveyed 719 senior executives to assess their views on green buildings. The first finding indicates that the green building activity is expected to increase. Ninety percent of the executives expect a substantial increase in green building projects.

According to the participants of Tuner Construction's survey, public facilities (not including the education facilities) are expected to have the major green activity over the next three years. Thirty percent of executives expected it and 66% believed that it would be among the top three sectors. The reason for the green activity expectation tops for the public buildings is that the increasing interest of government to ensure that their funding are invested in sustainable construction projects. According to Turner's report [7], roughly 10% of the buildings registered by the LEED Green Building Rating System are U.S. government projects and numerous federal agencies have Green initiatives. The executives ranked educational facilities next highest expected sector for green building activity. Twenty four percent of executives expected it and 60% believed that it would be among top three sectors. The reason that the expectations are high for educational facilities is that the recognition of the positive impact that sustainable construction can have on student performance and test scores.



The Turner report also adds that a study by the Hershong Mahone Group, a consulting services company specializing in building energy efficiency, of the test scores of 21,000 students in California found that those in classrooms with the most natural light scored 26% higher on reading tests and 20% higher on mathematics tests than did students with the least amount of daylight. An analysis of student performance in Chicago and Washington, DC schools found that children in better school facilities scored three to four percentage points higher on standardized tests, even after controlling for demographic factors. A study of six schools in Johnston County, North Carolina discovered that children attending schools with full spectrum light were healthier and absent on average three to four days less than were students in classrooms with conventional lighting. The executives ranked the commercial facilities the third highest expected sector for Green building activity. Twenty percent of executives are high for commercial facilities is that Green construction facilities increases employee's productivity and decreases absenteeism in workplaces illuminated by day light rather than artificial light.

Executives were asked about the most important characteristics for a facility to be considered a green building. Five key aspects of Green design identified by the U.S. Green Building Council were asked to be rated by executives: Energy efficiency, indoor environmental quality, conservation of resources or materials, sustainable site planning and safeguarding water or water efficiency. More than half of the executives ranked the energy efficiency as the single most important characteristics of a green building. Ninety percent of the executives ranked it among the top three important factors. The second important characteristic with the rate of 69% is indoor environment quality. The reason that the executives cited energy efficiency as the single most important factor is that because it provides major cost benefits.

More than 80% of executives (combination of executives who were already involved and who were not involved before) said the energy costs of Green buildings were less than those of non-Green buildings. The operating costs of these buildings were also lower. More than three-quarters of executives at organizations involved with Green buildings think that it is less costly to operate and 66% reported that their cumulative operating and maintenance costs over 10 years were lower.

The health and well being of occupants of green buildings is greater according to survey participants. Not only 91% of executives at organizations involved with green buildings said that, so did 78% of executives at organizations not involved with green buildings. The findings are consistent with a study by the Lawrence Berkeley National Laboratory that reports U.S. businesses could save as much as \$58 billion in lost sick time if improvements were made to indoor air quality of the work environment [8]. The Turner report also mentions that a study by Herman-Miller found an increase in worker productivity of up to 7% after relocation to a Green facility with natural light.

Both executive groups agreed that Green buildings are more expensive to build. Seventy three percent of executives at organizations involved with Green buildings and 89% of executives at organizations not involved with Green buildings reported it. Executives who were already involved with Green buildings reported that their construction costs were 14% higher whereas



the executives who are not involved with green buildings yet reported that the cost should be 20% higher according to their own researches. There are number of studies concerning the cost of Green buildings. According to Turner Construction's report, a study by California's Sustainable Building Task Force of 33 Green buildings found that the average increase in construction costs was slightly less than 2%. This study found that this modest level of investment could result in savings of 20% of total construction costs over the life cycle of a building [8].

Another study by the firm of Davis Langdon Adamson of the construction costs reported in Turner Construction's report claims that the costs of more than 600 projects of various types came to a similar conclusion. It found that the cost per square foot for buildings seeking LEED certification falls into the existing range of costs for buildings of similar program types and that many projects were able to achieve sustainable design with little or no additional cost [9]. Although there is a consensus in high construction costs of green buildings, 94% of all executives reported that their high construction costs were repaid through lower operating costs, such as energy savings, increased worker productivity, and other benefits.

What are the obstacles to Green building activity? Executives were also asked about this issue. Although they reported that the higher costs were paid off through lower operating costs and maintenance costs, 70% of executives rated the higher costs as a very or extremely significant factor discouraging the construction of green buildings. Half of the of the executives reported that reliance on annual budgets that don't take account of savings or benefits occurring over several years, the perception that the payback period is too long, and the difficulty in quantifying benefits. These two obstacles were followed by the third one which is the lack of awareness of green buildings benefits among executives. According to 63% of executives, the lack of awareness is an extremely important obstacle. Only 37% of executives at organizations not currently involved with green buildings reported they were very knowledgeable with green buildings.

More than half of the executives believed that government encouragement such as tax incentives were extremely effective about stimulating the interest for green buildings. Utility rebates were also encouraging. Among the many programs sponsored by utilities, Pacific Gas and Electric's statewide program under the auspices of the California Public Utilities Commission offers building owners incentives up to \$150,000 per building to encourage energy efficient design [10].



CONCLUSIONS

There is increasing recognition that buildings cannot be designed without consideration for their social impact on the environment. Waste and pollution affect communities. Issues of sustainability will force societies to consider buildings in relation to towns and cities, and the evaluation of building performance will involve the quality of indoor environments [3].

Building owners in the private sector were initially reluctant to invest in an approach that had not yet been proven. As governments began quantifying the benefits, such as significant employee productivity gains, reduced operating costs, increased occupancy rates, and higher rents, the private sector began to look more closely into the advantages of green buildings.

Despite growing private-sector interest, governments still represent 42 percent of new construction projects that are LEED certified. LEED is established by the U.S. Green Building Council [5]. LEED Green Building Rating System, a set of voluntary national standards for constructing sustainable buildings is rapidly gaining acceptance [7].

Green buildings have major existence in government projects (other than educational facilities) due to government initiatives. These buildings are expected to prove cost benefits for owners so they can consider green buildings in their projects.

The findings indicate that cost benefits coming from the energy efficiency could be the major reason for owners to prefer green buildings. Also, reduced absenteeism, improved health conditions, well being of employees and consequent increased productivity provides indirect cost benefits for owners.

The findings also indicate that green educational facilities increase students' success in tests and reduce their absenteeism.

There is still big concern among owners that green buildings are more costly than conventional buildings. The lack of awareness of green buildings creates a major obstacle in the spread of these buildings. Owners are not very familiar with these buildings and the associated cost benefits over the life cycle of buildings.

It is obvious that governments have a major role in the spread of Green buildings. More research studies must be performed in order to substantiate the benefits of Green buildings. It looks like cost benefits combined with government initiatives can increase Green building projects.



REFERENCES:

[1] Boake, T. M. Green Super Buildings, Alternatives Journal 2004, 30 (5), 19-26.

[2] Building Momentum. National Trends and Prospects for High Performance

Buildings. April 2002 Green Building Roundtable and Prepared for the U.S. Senate

Committee on Environment and Public Works by the U.S. Green Building Council, 2003.

[3] Godfaurd, J., Clements-Crome, D. and Jeronimidis, G. Sustainable Building Solutions: A Review of Lessons Learned From the Natural World, Building and Environment 2005 (40), 319-328.

[4] U.S. Green Building Council website, http://www.usgbc.org, accessed October 2002.
[5] Case, S. Building a Better Future – Government Leeds the Way; Government

Procurement, June 2006; 22-29.

[6] Hui, S. Sustainable Architecture and Building Design website, http://www.arch.hku.hk, accessed October 2002.

[7] Turner Green Building Market Barometer. Turner Construction Company Report on Green Buildings: Sacramento, CA, 2005.

[8] Kats, G. The Cost and Financial Benefits of Green Buildings. A Report to California's Sustainable Building Task Force, 2003.

[9] Matthiessen, L. F. and Morris, P. A Comprehensive Cost Database and Budgeting Methodology. Davis Langdon Adamson Consulting, 2004.

[10] White Paper on Sustainability: A Report on the Green Building Movement. Building Design and Construction 2003, (11), 22.



BLUEFIN TUNA (*Thunnus thynnus* L. 1758) FISHERY, FARMING AND MANAGEMENT IN THE MEDITERRANEAN SEA

Işık K. ORAY^{1,2}, F. Saadet KARAKULAK¹

¹University of Istanbul, Faculty of Fisheries, Istanbul, Turkey ²Cypriot Marine Sciences Foundation, Girne/TRNC isikoray@yahoo.com

In this paper, the latest stand of the bluefin tuna fishery in the Mediterranan Sea, the bluefin tuna farms and die Fisheries management is discussed. The main measures include the gradual reduction of TAC of 32.000 tons to 25.500 tons in 2010 and closed seasons for bluefin tuna fisheries for purse seining; 1 July-31 December. For large scale pelagic longline vessels over 24 m from 1 June-31 December. For boat boats from 15 November-15 May. For pelagic trawlers from 15 November to 15 May. Increase of the minimum size from 10 to 30 kg.

In the recent ICCAT meeting in Croatia in November 2006, a range of measures were set to ensure the recovery of the east Atlantic and Mediterranean bluefin tuna. The fishing overcapacity, poor enforcement of the existing measures resulting from illegal, unregulated and unreported fishing activities (IUU) will hopefully be overcomed by setting up a 15 year plan starting from 1st January 2007.

1. Introduction

The Atlantic bluefin tuna *Thunnus thynnus* (L.) is one of the most important commercial species among the large pelagic fishes living in the Atlantic Ocean and Mediterranean Sea.

The International Commission for the Conservation of Atlantic Tunas (ICCAT) recognizes two management units of Atlantic bluefin tuna: west and east Atlantic, the latter unit including the Mediterranean (ICCAT, 2005). Continous demand from the Sashimi markets increased the fishing pressure on bluefin tunas and stocks were reduced drastically. Fishing pressure became even more after the bluefin tuna farm activities began.

In this paper, the latest stand of the bluefin tuna fishery in the Mediterranan Sea, the bluefin tuna farms and die Fisheries management is discussed. The evaluation of ICCAT of the bluefin tuna stocks and the fisheries management till 2010 is investigated.

2. Bluefin tuna fishery in the Mediterranean Sea

The fisheries for Atlantic bluefin tuna are currently distributed from the Gulf of Mexico to Newfoundland in the West Atlantic, from roughly the Canary Islands to south of Iceland in the East Atlantic, and throughout the Mediterranean Sea. There are two spawning grounds known in the Atlantic, one in the Gulf of Mexico and one in the Mediterranean Sea. Assuming that bluefin tuna have homing fidelity, and noting some discontinuity in the longline catches in the offshore area, in the 1970s ICCAT divided the population into eastern and western stocks (Miyake et al., 2004).



The Mediterranean Sea are the major fishing areas, with 48% of the global catch in 2000. The fishery was the first industial fishery in the world using the traditional tuna trap, based in several places along the Mediterranean coastline. Economic supports from Japanese interests to North African countries during the 1980 and 1990s, and joint ventures with European companies, have increased the fishery activities of Mediterranean countries and their commercial capacities (De la Serna *et al.*, 2002).



Fig.1. Global catch of northern bluefin tuna by area in 2000 (FAO, 2002)

The catches of bluefin tuna in the eastern Atlantic Ocean (including the Mediterranean) increased from 1950 to 1955, reaching almost 40 000 tonnes in 1955. After that the catches declined to a minimum of approximately 10 000 tonnes in 1970. The catches then increased until 1996, when the maximum catch of approximately 50 000 tonnes was taken. The cathes decreased to 33 093 tonnes in 2002. The 2002 catch was about 65 percent of the maximum catch, taken in 1996 (Bayliff et al., 2005). The catch of 2002 was about. 65. percent of the maximum catch taken in 1996 (Bayliff et al., 2005). This catch amount decreased to 33093 tons in 2004. (ICCAT, 2006). The principal fishing countries in 2004: France (7032 tonnes), Italy (4686 tonnes), Marocco (2780 tonnes), Spain (5154 tonnes), Tunisia (2376 tonnes), Turkey (1075 tonnes) and Japan (2624 tonnes) (ICCAT, 2006).

The Mediterranean fishery for bluefin tunas is based on migration patterns. At the beginning of the season, from May to July, those that arrive in the Mediterranean Sea are in the "genetic phase" (large pre-spawned fish), at the end of the season, from mid July to September, theyare on their way out of the Mediterranean, moving into the Atlantic Ocean for breeding (Doumenge, 1999).

These increases in the bluefin tuna catch in the East Atlantic (including the Mediterranean) were possibly the result of an increase in fishing effort, generated by the increasing demand for bluefin tuna for sashimi market.



Fig. 2. Bluefin tuna catch in the Atlantic Ocean including the Mediterranean Sea in1950-2005 (ICCAT, 2006)

3. Bluefin tuna farming in the Mediterranean Sea

In the last years bluefin tuna farming in the Mediterranean Sea has spread very rapidly. This is due to the developing of the Japanese markets and the increasing demand to this fish species. The first commercial tuna farming operation in the Mediterranean area started in 1979 in Ceuta (Spain). Today the bluefin tuna farms exist in many Mediterranean countries like Croatia, Cyprus, Greece, Italy, Libya, Malta, Morocco, Tunisia, Turkey and Spain. Countries like Syrien and Lebanon are thinking to set up bluefin tunas farms.

In 1998 the export of bluefin tunas of 1241.5 tons from the Mediterranean farms to Japan increased to 12 577.4 tons in 2003 (FAO, 2005).

Mediterranean tuna farming is based on capturing bluefin tuna in the wild by purse seine during or just after breeding, transferring them to special transport cages, towing the cages to offshore facilities, and feeding with high lipid content fish (sardine, herring, mackerel) and cephalopods. The fish are then kept in large floating cages for variables periods, ranging from a few months to years, depending on the farming location and fish size. The fattened fish are sold fresh and frozen to Asian markets mainly Japan.

The aquaculture of bluefin tunas in the farms in the Mediterranean has opened a new area of employment. The farms support the side organizations and have a socio- economical effect. Fish weight increment or change in the fat content of the flesh is obtained through standard fish during short periods of time (2-6 months) aimed mostly at increasing the fat content of the flesh, which strongly in fluencies the prices of the tuna meat on the Japanese sashimi market, can also be referred to as "tuna fattening".



Future tuna farming practices may evolve to encompass a closed life cycle. i.e the rearing of larvae in laboratory conditions (SCRC). The rapid increase in tuna farming has changed fishing strategies in the Mediterranean Sea. Nearly all fish caught by purse seiners are transferred to cages for fattening.

In keeping the fisheries statistics and evaluation, some difficulties arise. According to the ICCAT recommendation (REC. 04-06) the fisheries statistical data are derived from the export data, which leads to some incompleteness. In order to make an evaluation of the stock, the size composition of the catch should be known. When the bluefin tunas are transferred to the cages, they are registered by underwater cameras. The total catch amount and the total weight of the fish are guessed roughly, leading to wrong figures on the total catch. The information of growth and conversion rates of the bluefin tunas is not sufficient. Presently, ICCAT estimates an average of 25% of the bluefin tuna body weight during the capture based aquaculture period.



Fig.3. Map showing the sites of the bluefin tuna farms in the Mediterranean Sea.

Information on countries operating bluefin tuna farms in the Mediterranean Sea is given below.

Croatia

The fattening of BFT started in Croatia in 1996. In 2003, there were 12 farms in place in the counties of Zadar, Šiberik and Split with 70 floating cages (FAO, 2005). The individuals captured range from some extremely small fish (less than 10 kg, including undersized or just legal minimum size set by ICCAT at 10 kg) to small fish (20-80 kg). These are caught by the Croatian, Italian, French, Spanish and Tunisian purse seiners between May and September. The catch quota given by ICCAT for this country in 2003-2006 is 900-970 tons/year (REC. 02-08). In 2004, the exported amount of bluefin tunas from the farms to Japan was 3 803,2 tons (FAO, 2005)



Cyprus

Cyprus started BFT farming in 2003. In 2004, there were 2 farms in place; one in the east (Famagusta Bay) and the other in the south (Limasol Bay), worth 6 floating cages. The captured individuals were 30 to 500 kg (mean size 150 kg). The bluefin tunas were caught by the French and Spanish purse seiners in the Eastern Mediterranean Sea between May and June. ICCAT has a allocated for the European Union Countries for 2003-2006 18.582-18.301 tons per year (REC. 02-08). Cyprus is using a part of this catch quota. Farming seasons is 5-8 months. In 2004 326,7 tons of bluefin tunas were exported from the bluefin tuna farms to Japan (FAO, 2005).

Greece

Greece started BFT farming/fattening in 2004. One bluefin tuna farm was established off the island of Ithaki, Echniades Islands, Keffallonia Prefecture, worth 8 floating cages. The captured individuals ranged from 95 to 330 kg (mean size 187 kg). The bluefin tunas were caught by the Greece and French purse seiners in August. Greece is using a part of the quota of the EU countries. Farming seasons is 7 months.

Italy

Experiments were carried out in Italy from 1978 to 1982, when some large bluefin tuna were cultured using a small floating cage in the Scopello trap (Sicily). However, commercial capture-based aquaculture of tuna did not start until between 1999 and 2000 in the southwest of Sicily and in 2001 in the central Adriatic Sea (Miyake *et al.* 2003). In 2003, there were 4 farms, worth 12 floating cages. The captured fish were between 30 and 300 kg (mean size 130 kg). These fish were caught by the Italian, French and Spanish purse seiners between May and June Italy is using a part of the quot of the EU countries. Farming seasons is 3-6 month. In 2004; 604 tons of bluefin tunas were exported from the Italian farms to Japan (FAO, 2005)

Libya

Libya started BFT farming in 2003. There were 2 farms in place in the coast of Tripoli, worth 7 floating cages. The fish were between 50 and 250 kg (mean size 150 kg). The bluefin tunas were captured in Libyan waters by the Libyan purse seiners, were entered to the cages in June and July The ICCAT quota for Libyia for the years 2003-2006 is between 1 286- 1 440 tons per year. Farming seasons is 5-6 months. In 2004, 70.3 tons of bluefin tunas were exported from the Libyans farms to Japan (FAO, 2005)

Malta

Malta started BFT farming in 2000. In 2003, Malta had five registered bluefin tuna farms. The captured individuals range from 80 to 620 kg (mean size 350 kg). These were captured mostly in the international waters by the Italian, French and Libyan purse seiners, were entered to the cages in May to July, were kept in the cages until October to January. Malta uses a part of the EU quota. Farming season is 4-7 months. In 2004, 3960.3 tons of bluefin tunas were exported from the Maltese farms to Japan (FAO, 2005).



Morocco

In Morocco experimental culture of bluefin tuna started in the mid 1990's. The Moroccan Kingdom and the Japanese government undertook a joint venture; a large scale experimental project for the bluefin tuna farming in the North-West of the country, on the Mediterranean Coast. Its main purpose was to develop the technology for artificial breeding of the bluefin tuna (Nhhala, 2002). In 2003-2006, the catch quota for Morocco varied between 3030-3177 tons per year (REC. 02-08)

Spain

The first commercial tuna farming operation in Spain started in 1979 in Ceuta. Large postspawned lean tuna were captured in traps, put in large pens and fattened (Miyake *et al.* 2003). In Spain; the real bluefin tuna farming started in 1985 in the Andalusia Region and in 1997 in the Murcia Region. There were 2 farms in the Andalusia Region and 9 farms in the Murcia Region (FAO, 2005). The captured individuals ranged from 50 to 200 kg (mean size 120 kg). These were caught by the Spanish and French purse seiners between June and July. The ICCAT quota for EU countries is partly used be Spain. Farming seasons is 6-9 months. In 2004, 5805.8 tons of bluefin tunas were exported from Spanish farms to Japan.

Tunisia

Experimental culture of bluefin tuna was carried out in Tunisa in 2003. These were captured mostly from north of the country to the extreme south (Hakl el bouri, on the Tunisian-Libyan border) by Tunisian purse seiners with French, Spanish and Italian fishermen, were entered to the cages in May to July, and kept in the cages until September to March. The weight of these fish varied between 50 kg to more than 250 kg. For Tunusia, ICCAT has allocated a catch quota of 2503-2625 tons per year for of the years 2003-2006. In 2004, 461.4 tons of bluefin tunas were exported to Japan.

Turkey

The fattening of bluefin tunas started in 2002. In 2004, there were 6 farms in the Aegean Sea (Ildır Bay) and North Levantine Sea (Antalya Bay), worth 47 floating cages. The individuals ranged from 25 to 450 kg (mean size 80-90 kg). The bluefin tunas were caught by the Turkish purse seiners in the North Levantine Sea between May and July. Turkey became a member of ICCAT in 2003 and did not have a country catch quota. In 2003-2006; the catch in the category for "others" of 1114-823 tons per years was used (REC. 02-08). The Farming seasons is 4-9 months. In 2004, 1876.1 tons were exported from the Turkish bluefin tuna farms to Japan (FAO, 2005)

4. Management

The International Commission for the Conservation of Atlantic Tunas (ICCAT) was created by treaty in 1966 and commissioned in 1969. Its founding was prompted by rapidly expanding tuna fisheries in the eastern Atlantic and increasing competition between purse seiners and longliners there, as well as by concern about possible depletion of West Atlantic bluefin tuna. ICCAT assumed scientific and management authority throughout the Atlantic and Mediterranean for "tunas and tuna-like species".



ICCAT's stock assessment and scientific analyses are conducted by the Standing Committee on Science and Statistics, which is composed by the scientists of the member countries. This committee makes recommendations to ICCAT's managers, who likewise represent the various member countries in respective delegations. These managers make recommendations intended to be policy, for implementation by member countries. Implementation of these recommendations is essentially voluntary, and the quality of compliance and enforcement varies among countries.

The first ICCAT recommendation on closed seasons, not to catch bluefin tunas smaller than 6.4 kg was made in 1975. The minimum size was increased in 2004 to 10 kg. In 2006, the recommendation for the minimum size of 30 kg/per fish was introduced. The restriction for longlining was changed as of 1 June-31 December, the restriction change being for bait boats as 15 November – 15 May. For pelagic trawling the change of the restriction was from 15 November to 15 May. In 2002 the allocation of quotas for the catch of bluefin tunas in the Mediterranean Sea was started. As a result of sharing of the catch quotas, the TAC (the total allowable catch of bluefin tunas) in the Eastern Atlantic Ocean and Mediterranean Sea was set as 32.000 tons in 2002 and for the year of 2006, 29.500 tons.

| | Catch Quotes (ton) |
|--------------------|--------------------|
| European Community | 19 615 |
| Algeria | 1 700 |
| China | 76 |
| Croatia | 971 |
| Japan | 2 911 |
| Korea | 49 |
| Tunisia | 2 087 |
| Libya | 1 330 |
| Morocco | 3 030 |
| Others | 1 184 |

Table1. Catch quotes of the countries in 2002.

Table 2. Planned catch quotas for countries between 2003 and 2006

| | 2003 | 2004 | 2005 | 2006 |
|--------------------|---------|--------|--------|--------|
| European Community | 18 582 | 18 450 | 18 331 | 18 301 |
| Algeria | 1 500 | 1 550 | 1 600 | 1 700 |
| China | 74 | 74 | 74 | 74 |
| Croatia | 900 | 935 | 945 | 970 |
| Japan | 2 949 | 2 930 | 2 890 | 2 830 |
| Tunusia | 2 503 | 2 543 | 2 583 | 2 625 |
| Libya | 1 286 | 1 300 | 1 400 | 1 440 |
| Morocco | 3 0 3 0 | 3 078 | 3 127 | 3 177 |
| Others | 1 146 | 1 100 | 1 000 | 823 |



By setting the bluefin catch quotas; of the years 1994 or 1995 was taken as the reference. Table 1 shows catch quotas for different countries. Seven countries (in 2002) which were not ICCAT members are classified as "others category". The catch quotas for countries between 2003 and 2006 are shown in Table 2.

In the stock assessment in 2006, a decrease in the bluefin tuna stocks was seen very clearly. Due to this, the catch quotas have been cut. The TAC for 2007 was set as 27.000 tons whereas the TAC for 2010 was decreased to 25.500 tons.

5. Results and Discussions

The cost of the bluefin tuna farms is high. The farms make in relative short periods big profits. Many fish exporters and fishermen tend to make big investments in bluefin tuna farms. Bluefin tunas are caught in a period when the price of the fish is cheap in the summer. Bluefin tunas are fed mostly 3-6 months long, fattened and sold at a time in winter when the demand and the prices are at the peak. This leads to increases in fishing effort .In the beginning; the demand of small and medium sized fish were more. In the last years; bluefin tunas off all sizes, especially the large sized fish, more than 8 years old were fished more intensively (ICCAT, 2006). Note that the harmful effects of tuna farming on catch statistics, fishing pressure on small the pelagic fish and introduction of viral diseases were also stressed by conservation organizations for several years (WWF, 2002, 2005).

There are four spawning areas for bluefin tunas in the Mediterranean Sea (Nishidaa et al., 1997; These areas are the Balearic Islands, Malta and the waters area around it, east coasts of Sicily, the Bay of Mersin and the Northern Levantine Sea (Oray and Karakulak, 2005). Most probably the whole Eastern Mediterranean Sea (Cyprus, the coasts of Syria, Isreal and Egypt) is a spawning area of bluefin tuna.

The optimal seawater temperatures of 23-25°C (Garcia et al., 2003) for the reproduction of bluefin tunas in 2004 in the Northern levantine Basin were in the first week of May, whereas optimal conditions in the western Mediterranean Sea (SATMER, 2004) were at the end of June. Hydrographic factors can differ from year to year and the beginning of the reproduction period can vary by some 15 days (Karakulak et al., 2004). The bluefin tuna catches of mid-May to early June are brought to the fattening cages earlier than in the western Mediteranean Sea (Oray and Karakulak, 2005)

ICCAT has made a new recommendation for the period between 2007 and 2010. One of these recommendations is the 30 kg minimum size per BFT, which seems to be good for the stock. The first reproduction for the BFT in the Mediterranean Sea is around 50% between 100-104 cm (3 years) groups. 100% between 135-139 cm (4-5 years old) (Corriero *et. al.*, 2005). The mentioned recommendation of 30 kg minimum size (fish more than 5 years old) seems to give the bluefin tunas at least a chance to reproduce once.



The application of closed seasons for purse seiners, longlines, pelagic trawls and bait boats is set up to protect the juvenile bluefin tunas. In order to protect the reproducing stock this restriction could have preferably covered the period between May-July. National quotas of bluefin tunas should be assigned to countries, such as Turkey and Cyprus, bordering the bluefin tuna spawning grounds in the Northern Levantine Sea.

A global control system, the application of a joint international inspection scheme, others restrictions and this multiannual plan will hopefully bring a 50% reduction in the catches of juvenile tuna as well as a substantial cut in catches of the adults.

The main measures include the gradual reduction of TAC of 32.000 tons to 25.500 tons in 2010 and closed seasons for bluefin tuna fisheries for purse seining; 1 July-31 December. For large scale pelagic longline vessels over 24 m from 1 June-31 December. For boat boats from 15 November-15 May. For pelagic trawlers from 15 November to 15 May. Increase of the minimum size from 10 to 30 kg.

In the recent ICCAT meeting in Croatia in November 2006, a range of measures were set to ensure the recovery of the east Atlantic and Mediterranean bluefin tuna. The fishing overcapacity, poor enforcement of the existing measures resulting from illegal, unregulated and unreported fishing activities (IUU) will hopefully be overcomed by setting up a 15 year plan starting from 1st January 2007.

REFERENCES:

- Bayliff, W.H., Leiva Moreno, J.I. de, Majkowski, J. 2005. Second Meeting of the Technical Advisory Committee of the FAO Project "Management of tuna fishing capacity: conservation and socio-economics". FAO Fisheries Proceedings No.2, 336 p., Rome.
- Corriero, A., Karakulak, S., Santamarina, N., Deflorio, M., Spedicato, D., Addis, P., Desantis, S., Cirillo, F., Fenech-Farrugia, A., Vasallo-Aguis, R., De La Serna, J.M., Oray, I.K., Cau, A., Megalofonou, P., De Metrio, G. 2005. Size and age at sexual maturity of female bluefin tuna (*Thunnus thynnus L.* 1758) from Mediterranean Sea. J. Appl. Ichthyol. 21: 483-486, Blackwell Verlag, Berlin.
- De la Serna, J.M., Di Natale, A., Pereda, P., Restrepo, V, Tserpes, G. 2002. Large pelagic species: future management of common Mediterranean resources. In Consorzio Mediterraneo, Rome, eds. Proceeding of the International Conferences on Mediterranean Fisheries, Naples, Italy, 21-22 June 2002, pp.353-362, Rome,Italy.
- Doumenge, F. 1999. L'aquaculture des thons rouges et son développment économique. Biologia Marina Mediterranea, 6(2):157-162.
- FAO, 2002. FAO yearbook. Fishery statistics: capture production 2000. FAO Fisheries Series No.60, Rome, Italy.
- FAO, 2005. Third meeting of the Ad Hoc GFCM/ICCAT working group on sustainable bluefin tuna farming/fattening practices in the Mediterranean. FAO Fisheries Report No. 779, 108 p, Rome.
- Garcia, A., Alemany, F., Velez-Belchi, P., Rodriguez, J.M., Lopez Jurado, J.L., Gonzalez Pola, C., De La Serna, J.M. 2003. Bluefin and frigate tuna spawning off the Balearic archipelago in the environmental conditions observed during the 2002 spawning season.



ICCAT. Collective Volume of Scientific Papers 55(3), SCRS/02/165, pp. 1261-1270.

- ICCAT, 1974. Recommendation on bluefin tuna size limit and fishing mortality. No: 74-1, Madrid.
- ICCAT, 2004. Recommendation on bluefin tuna size limit [Rec. 04-06]. Madrid.
- ICCAT, 2002. Recommendation by ICCAT concerning a multi-year conservation and management plan for bluefin tuna in the east Atlantic and Mediterranean [Rec. 02-08]. Madrid
- ICCAT, 2006. Report of the 2006 Atlantic bluefin tuna stock assessment session. SCRS/2006/013, Madrid.
- Karakulak, S., Oray, I., Corriero, A., Deflorio, M., Santamaria, N., Desantis, S., De Metrio, G. 2004. Evidence of a spawning area for the bluefin tuna (*Thunnus thynnus* L.) in the eastern Mediterranean. J. Appl. Ichthyol. 20, 318-320, Blackwell Verlag, Berlin.
- Miyake, P.M., De la Serna, J.M., Di Natale, A., Farrugia, A., Katavic, I., Miyabe, N., Ticina, V., 2003. General review of bluefin tuna farming in the Mediterranean area. Col. Vol. Sci. Pap. ICCAT, 55(1): 114-124, Madrid.
- Miyake, P.M., Miyabe, N., Nakano, H. 2004. Historical trends of tuna catches in the world. FAO Fisheries Technical Paper No. 467, 74 p., Rome.
- Nhhala, H. 2002. Research and development experience in bluefin tuna experimental breeding in Morocco. In Book of Abstracts of the First International Symposium on the Domestication of the Bluefin Tuna *Thunnus thynnus*, Cartagena, Spain, 3-8 February 2002, pp 47. Zaragoza, Spain, International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM).
- Oray, I.K., Karakulak, F.S. 2005. Further evidence of spawning of bluefin tuna (*Thunnus thynnus thynnus* L., 1758) and the tuna species (*Auxis rochei* Ris., 1810, *Euthynnus alletteratus* Raf., 1810) in the eastern Mediterranean Sea: preliminary results of TUNALEV larval survey in 2004. J. Appl. Ichthyol. 21, 236-240, Blackwell Verlag, Berlin.
- WWF, 2002. Tuna Farming in the Mediterranean: the 'coup de gra^ce' to a Dwindling Population? When Bluefin Tuna Becomes Golden Tuna. WWF Publications, WWF Mediterranean Programme Office, Barcelona, 14 pp.
- WWF, 2005. Risk on Local Fish Populations and Ecosystems Posed by the Use of Imported Feed Fish by the Tuna Farming Industry in the Mediterranean. WWF publications, WWF Mediterranean Programme Office, Rome, 11 pp.



COMMUNITY BASED ECO-TOURISM POTENTIALS AT THE DIPKARPAZ NATIONAL PARK AREA: OPPORTUNITIES AND THREATS

Dervis YUKSEL

School of Tourism and Hotel Management Near East University, TRNC dyuksel@neu.edu.tr

This paper analyzes the opportunities and threats for ecotourism prospects at the Dipkarpaz National Park Area (DNPA). The DNPA, one of the four most important ecological sites of the island of Cyprus, is home to endangered monk seal, Green Turtle and vulnerable Loggerhead, thousands of local and migratory birds, endemic flora, rare plants, feral donkeys, species of fish and crustaceans, sea-mammals, land-flying mammals, reptiles, marine plants that provide shelter, habitat space and food for both fish and invertebrates, historical monuments and archaeological sites, natural barriers, hills, sandy beaches, sandstones and rocks, and antique quarry sites. Community-based eco-tourism could be used as a development model in finding the right balance between the protection of the biological diversity and the enhancing of the quality of life of the local people of the Dipkarpaz region.

INTRODUCTION:

The island of Cyprus, is void of terrestrial and marine parks. The land and natural and biological resources have been misused for centuries, therefore, good fauna and flora exists only on small and remote areas of the Island. The four areas in Cyprus which are of vital ecological importance are: Akamas Peninsula in the west, Larnaka and Limassol salt lakes in the south and Karpas Peninsula in the north- east. According to Kettaneh et. al. (1988), "the Peninsula and sea shores will be the most ideal National Park in the Eastern Mediterranean Region, due to its good location near Turkey, Syria, Lebanon and Israel and closeness to Europe, North Africa and Asia."

UNDERSTANDING COMMUNITY-BASED ECOTOURISM DEVELOPMENT

"After WW2, parallel to the technological developments, population growth, increase in the disposable income and development of means of transportation promoted the development of mass tourism. Mass tourism's environmental and socio-cultural cost on localities throughout the world have prompted policy makers at the international, national and community levels to re-examine their stance towards industry. Consequently, there is growing understanding in different stakeholders that future tourism developments should be sustainable. In terms of tourism, whereas conventional mass tourism could be defined as the product of global greed economy, ecotourism could be an element of alternative tourism that targets the sustainable society" (Yuksel, 1997).



Many definitions of ecotourism have been developed since the phrase was coined in the mid-1980s by Ceballos-Lascurain, "Ecotourism is environmentally responsible travel and visitation to relatively undisturbed natural areas, in order to enjoy and appreciate nature (and any accompanying cultural features - both past and present) that promotes conservation, has low negative visitor impact, and provides for beneficially active socio-economic involvement of local populations" (Ceballos-Lascurain, 1996). The International Ecotourism Society defines ecotourism as "responsible travel to natural areas that conserves the environment and sustains the well-being of local people". This definition not only implies that there should be a recognition of, and positive support for, the conservation of natural resources, both by suppliers and consumers, but also that there is a necessary **social dimension** to ecotourism.

As (WWFI, 2001) identified "the term **'community-based ecotourism'** takes this social dimension a stage further. This is a form of ecotourism where the local community has substantial control over, and involvement in, its development and management, and a major proportion of the benefits remain within the community".

The **community-based ecotourism development** is based on three core principles; conservation has to take place, the local community has to benefit from tourism and it should educate tourists, industry and the host population that refers to the three main principles of sustainability:

- Ecological Sustainability to protect the ecology and biological diversity that ensures ecotourism development to be appropriate to the carrying capacity of the ecosystem
- Social and Cultural Sustainability to preserve a society's identity that enables the decision making to involve all the stakeholders of the community
- Economic Sustainability to ensure economic efficiency and the management of resources so that they can support future generations (Nikolova and Hens, 1997).

BACKGROUND OF THE DIPKARPAZ NATIONAL PARK AREA

Geographical Location

Cyprus is the third largest island after Sicily and Sardinia, situated in the north-eastern corner of the Mediterranean Sea. She has an area of 9,251 square kilometers. The distances to the neighboring coasts are 72 km to the north Turkey, 105 km to the east Syria, 350 km to the south Egypt and 600 km to the west Greece. Dipkarpaz National Park Area (DNPA) is located in the eastern side of the island of Cyprus at the Karpaz Peninsula as shown on the (**Figure 1**). The boundaries of the Park was defined by the line joining the points of latitude and longitude

(15°5'E - 38°.0'N; 18°.0'E - 34°.4'N; 23°.2'E - 34°.6'N ; 23°.7'E - 24°.1'N).

This distinct area, comprising the land mass and the surrounding marine environment, extends from the eastern side of the town of Dipkarpaz (village located middle of the distance between north and south side of sea coast with the population around 2,000 people) to the tip of the Island which is known as Cape St. Andreas, including a group of small islands (Klidhes islands). The sea surrounds the area from three sides, i.e. North, East and South, therefore the elongated land resembles a tongue. The average length of the area from west to east is about 22 km. and the width is about 5 km. Accordingly the DNP Area is 94.9 km². The length of the coast around the DNPA is about 65.8 km.



Legal Status of the Dipkarpaz National Park Area

Efforts for the establishment of national parks in Cyprus have been continuing since 1983. In 1983 by the resolution of Council of Ministers an area of 2,000 ha. in Karpaz Peninsula declared as National Park. But the political pressures of tourism investors to develop this area for mass tourism stopped further studies in this respect. Struggle of wide range of environmentalists against tourism investments caused to conflicting resolutions of the Council of Ministers and leads to the position of stalemate for a long time. In 1988 Department of Forestry prepared a plan to establish three national parks and extended the area of Dipkarpaz National Park to 8,000 ha. Council of Ministers came with another resolution in 1993 identifying different boundaries for the 'Karpas Peninsula National Park Area' (Yuksel, 1996).

Studies done by The Department of Town Planning in 2004 for the park area, produced a physical plan for Karpas peninsula. Dipkarpaz National Park now is part of this planning area. The current boundary of the Dipkarpaz National Park was defined by the "Karpas Region, Control and Development Ordinance" by the resolution of the Council of Ministers (Oztek, 2005) . The Karpaz National Park area that comprised of the "Natural and Archaeological Site" and "Ancient Carpasia Archaeological Site" was designated by the Supreme Commission of Monuments in November 1995. It begins north east from Ronnas Bay's dunes and across the northern and eastern part of Dipkarpaz village to Chelones place in south of village up to the Cape Apostolos





Figure 1: Dipkarpaz National Park Area (as indicated by the dashed area) on "Karpaz Region, Control and Development Ordinance" Map.

Andreas. Despite the existence of an Ordinance that describes the Karpaz National Park Area "there is no official protected area network" (USAID-CYPRUS. 2006) in the northern part of Cyprus.

Topography and Geology

The land formation of the Karpaz Peninsula belongs to the third geological period and considered as the extension of Kyrenia Range in the north of the island which is an Alpine fold mountain system. The rocks are of the limestone and sand-stone character. They are considered as second grade aquifer for water holding. The elevation differs between sea-level and 241 m. The increase of the elevation is towards the center line and the western part of the Area.

Dreghorn (1978), describes the Dipkarpaz area as a chain of low hills and scarps that consists of two segments. The segment of the range between Dipkarpaz and Apostolos Andreas Forest, constitutes 10 km long by one km wide elongated plateau, whose height varies from 150 to 241 m. The other segment is found in the Apostolos Andreas section of the Karpaz Peninsula in the form of low dome-like plateau at an average height of 100 m.



Hydrogeology

The Karpaz Peninsula has mainly impervious rocks of the Kythrea Formation overlain by generally thin Pliocene-Pleistocene sedimentary rocks. Only near Dipkarpaz are the layers thick and enough to form small groundwater units. Water infiltrating into the Limestone Group, which forms the central backbone of the Peninsula, outflows in small springs (UNDP, 1970). There are no running or continuous water streams or wadis in the area. The main source replenishing the water resources of the Karpaz Peninsula is rainfall. All the wadis are running when the land is saturated after an excess rainfall and towards to north or south. There are more than 18 wadis draining the watersheds to the north or south. Water scarcity as whole of the Northern part of Cyprus have been due to the overused water resources, unsustainable water use and mismanagement (UNDP-PFF, 2006).

Flora and Fauna

"Dikarpaz National Park Area is one of the richest areas with respect to fauna in Cyprus. In Northern part of Cyprus, 1,410 species and subspecies of flora are identified. ³/₄ of these species and subspecies are found in Karpaz peninsula and ¹/₂ of these are growing in Dipkarpaz National Park area. Also, 24 species out of 47 species endemic to north Cyprus and 128 endemic to Cyprus are found in Dipkarpaz National Park. Park area is also houses more than 100 species of rare plants" (Oztek, 2005). Forests cover about 45% of the DNP Area of which 79.3% of the total forest area compose of nonproductive forests, whereas 20.7% of total forest land includes productive forests (Pinus brutia forests, maquis, Juneperus phenicea).

According to Meikle (1977), Karpaz Peninsula is one of the eight Botanical Divisions of Cyprus, where the DNPA comprising part of it. Meikle, described the Peninsula as an area of fertile cultivated fields, low hills and extensive sandy and rocky shores where flora includes a miscellany of rare plants such as *Fumaria galliardotii*, *Enarthcrocarpus arcuatus*, *Helianthemum ledifolium* and *Trifolium globosum*. *Rosamarinus officinalis*, very rare as a wild plant in Cyprus, grows in some abundance around the town of Dipkarpaz. Within the boundaries of DNPA thirteen endemic rare plants has been identified. The Carob (*Ceratonia siliqua*) and Olive (*Olea europaea*) are trees that cultivated since ancient times spreading all around the area.

Dianthus cypria, P.impinella cypria, Ferulago cypria, Hypericum repens Mentha Iongifolia ssp. Cyprica, Origanum majorana var. tenuifolium, Teucrium divaricatum ssp. Canescens, Mandragora officinarium and Juniperus spp. are some of the flora which are are found in the park area and protected under "The Flora and Fauna Conservation Ordinance" under which 51 species of plants were placed under conservation. Dipkarpaz National Park Area is an important place for fauna. According to "The Flora and Fauna Conservation Ordinance",238 species of fauna is under protection, and 162out of the total species live in the park area (local and migrants). 68 % of the endangered species under protection are found in the park area. Under the ordinance, 2 out of 5 mammals, 12 out of 16 reptiles, 147 out of 215 birds are found in the park area (Oztek, 2005).



Birds

Because of its convenient geographical situation, Cyprus is of great importance for the annual flight of millions of migratory birds (more than 200 species) within the West Palearctic- African Flyways. To Flint and Stewart (1983), out of 347 species some 46 resident and 27 migratory species breed regularly in Cyprus, while another 24 species breed occasionally, or have bred in the past. Because of the migratory characteristics of the birds of the island of Cyprus and proximity to mainlands the degree of endemism is high. Seven endemic subspecies detected by various studies in Cyprus, from which three subspecies recorded at the KarpasPeninsula (Cyprus Pied Wheatear *Oenanthe pleshanka cypriaca*, Cyprus Warbler *Sylvia melanothorax*, Jay *Garrulus glandarius glaszneri*).

Mammals

27 species have been found on Dipkarpaz including the endemic Cyprian Spiny Mouse *Acomys nesiotes* found in rocky dry parts of the DNPA, characterized by stiff bristles on back. Monk Seal *Monachus monachus* is the sole flippered mammal to be found in the DNPA and Akamas in Cyprus, an endangered species protected by international and Cyprian legislation. It is recorded on Klidhes islands and needs further studies to detect the habitat environs. DNPA also shelters four rare species of sea-mammals and two rare species of land mammals.

During the war in Cyprus in 1974 quite large numbers of domestic donkeys were let loose. Most of these were subsequently captured. However in the DNPA a feral population of donkeys have become established and grown. Population estimates are confusing. Department of Environmental Protection estimates the number of feral donkeys around 300, while villagers complaining of agricultural damage, stretch this number to thousands. Study of Godley (1994) who used mark and recapture techniques for the detection of population size of feral donkeys estimated this number as 300 to 400 animals with a density of eight to ten animals per km².

The latest study on feral donkeys of Karpaz Peninsula (Hamrick, et. al., 2005) estimated donkey density as 6.7 donkeys km^2 , and estimated total abundance as 800 donkeys for the entire 132.5 km^2 study area. There were 95 donkey groups and 464 individuals detected, collectively, during the study.

Reptiles

According to Schatti and Sig (1989), DNPA refuge eight kinds of lizards, four kinds of amphibians and nine kinds of snakes. These are regionally widespread species that most of them could be found around the island.

The study of WWF (1989), in Cyprus indicates that both marine turtle species that breed regularly in the Mediterranean are considered threatened species by IUCN; on a global level Green Turtle *Chelonia mydas* is endangered, the Loggerhead *Caretta caretta*. Both north and south beaches of DNPA is the home of *Chelonia mydas* and *Caretta caretta*. On the six beaches, referred to as the South Karpaz beaches, a total of 92 nests were identified (72 *Chelonia mydas* and 20 *Caretta caretta*). 1306 out of the1558 *Cheloia mydas* nests made on



Karpaz beaches in eight years research. This value is 84% of total nest in on All Karpas Beaches. It is therefore necessary to protect the North Karpaz and Agios Philon beaches which are so important. The regular continuation of this monitoring conservation and research is very important for the continued existence of marine turtles living in the Mediterranean (Kusetogullari, 2006).

Butterflies

19 species were recorded at DNPA.

Marine Flora

According to Russo (1994)," Marine plants, both seagrasses (e.g. *Posidonia oceanica*) and algae (predominantly the genus *Cystoseira*) are abound around the island of Cyprus. Seagrass and algal beds provide the basic substrata for offshore sublittoral fauna and provide shelter, habitat space, and food for both fishes and invertebrates."

The study of Russo (1994), found out 55 species of epifauna living on 12 sublittoral algae species at Cyprus waters. Of these, twenty epifauna species living on three sublittoral algae species detected at DNPA waters. The dominant algae in terms of abundance, cover and biomass was *Cystoseira barbata* where it covered 90% of the substratum and the epifauna species which inhabit marine algae around DNPA are predominantly mollusk, polychaete and amphipod taxa.

Historical and Archaeological Resources

Cyprus has very rich cultural heritage ranging from prehistoric period up to today. Dipkarpaz National Park Area played an important part in the historic culture.

In addition to individual monuments, there are archaeological city sites in the park area. There are five archaeological settlements in Dipkarpaz National Park. *Karpasia City Site*: (Classical – Middle Byzantine) *Urania City Site*: (Classical and Byzantine period) *Agridia City Site*: (Middle Byzantine period) *Chelones City Site*: (Archaic and early Byzantine period) *Kastros Settlement*: (Neolithic and Chalcolithic period) (Oztek, 2005).

In addition to ancient city sites, there are plenty of ancient monuments in Karpaz

| Aphrodite Akraia Temple Ruins | Hellenistic-Roman Period |
|-------------------------------|---------------------------|
| Ayios Philon | Early to Middle Byzantine |
| Panayia Afendrika | Early to Middle Byzantine |
| Asomatos | Early to Middle Byzantine |
| Ayios Photios | Early to Middle Byzantine |



| Ayios Yeryios | Middle Byzantine |
|--|--------------------------|
| Ayios Philos Agridhia | Middle Byzantine |
| Ayios Athanassia | Middle Byzantine |
| Ayios Synessios | Middle Byzantine |
| Ayia Mavra | Middle Byzantine |
| Ayia Marina | Late Byzantine |
| Ayios Yeryios Ruins | Late Byzantine |
| Panayia Daphnonda Ruins | Late Byzantine |
| Panayia Eleousa Monastery | Late Byzantine-Mediaeval |
| Apostolos Andreas Church and Monastery | Mediaeval |

DIPKARPAZ NATIONAL PARK AREA: SWOT ANALYSIS

For better understanding of the state of the resources that would be the basis for community-based ecotourism development in the region, a SWOT analysis (Strengths, Weaknesses, Opportunities and Threats) was performed based on the literature, personal observation and interviews with experts. The SWOT analysis provides an overview of the current state in the region. It also revealed insights for developing possible policies.

The SWOT analysis has a qualitative nature, which helps one to discover information about values and resources a destination possesses. The result of the SWOT analysis of Dipkarpaz National Park Area is presented below:

DNPA: Strengths

- Ronnas Bay is the third most important nesting site for Green Turtles in the Meditterrenean
- One of the fewer places in the Meditterrenean that mass tourism have not been developed
- One of the four most important ecological sites on the island of Cyprus (together with Akamas and Salt Lakes)
- Shelters the Kastros -first human settlement site of the Island of Cyprus
- Home of the;

-4 important ecological sites of the Island

- -17 out of 85 nesting sites for Caretta caretta ve Cylenia midas
- -Unspoilt dunes

-Historical monuments and archeological sites of different historical periods



- -Endemic and rare flora and fauna
- -migration route of "West Palearctic-African Flyways"
- -Klidhes Islands as breeding site of Endangered Monacus monacus and Larus audouinii
- -Outstanding natural sites
- -Multicultural life
- -Serene environment
- -Natural and attractive beaches
- -Apostolos Andreas Monastery
- Declaration as national park by the "Karpaz Region, Control and Development Ordinance"
- Topography of the area provides suitable habitat for migratory birds and other fauna

DNPA: Weaknesses

- Lack of any strategy and policy for the Area
- Lack of a legal and administrative framework for the protection status of the Area
- Lack of monitoring and protection of biological diversity of the Area
- Unprotected Cultural Heritage
- Lack of system to monitor state of the environment and information system in the Area
- Lack of management plans for natural and cultural resources
- Tuna Fishing as a foreign economic activity
- Difficulty of preserving wild life because of the lack of information and awareness
- Illegal picking up of endemic and threatened species

DNPA: Opportunities

- "Karpaz Region, Control and Development Ordinance"
- Potential for locally operated Tuna Fishing
- Tuna Fishing as a touristic attraction
- Projects supported by international institutions
- Convenient environment for education and scientific research
- Potential for development of the awareness for the stakeholders related to the Area



- Potential resources of the DNPA to support the economic, social and cultural development of the local people
- Geological formations that enables geo-park, geo-tourism and scientific research
- Integrated marketing potential of sustainable products in the Area
- Guest-house tourism considered as best practice in the Dipkarpaz village
- Potential employment opportunities for the future
- Potential for the maintenance and protection of biological diversity
- Potential contribution of the endemic flora and fauna to the ecotourism activities

DNPA: Threats

- 25,000 bed capacity planned by the "Karpaz Region, Control and Development Ordinance" at the neighboring area
- Plans to bring electric power infrastructure to the Park Area
- Destruction of the 7000 years old Kastros Neolithic Settlement Site
- Destruction of Shelones-Banaia Church
- Environmental degradation and pollution created by the tankers, ships and fisherman boats
- The currents of the Northern Levantin that sweep the coast in an anticlockwise direction brings all the surface garbage of Lebanon to the DNPA's coast.
- Destruction of natural and cultural resources
- Lack of commitment of the requirements for the sustainable planning and management of the DNPA.
- Ideas supporting the mass tourism at the Area
- Leaving the Dipkarpaz village outside the boundaries of DNPA.
- No buffer zone established between DNPA and adjacent regions
- Failure of central and local governments in managing and controlling the DNPA
- Leakage of regional revenues against the local community
- Intensive hunting pressure for the Area
- Construction activities against traditional architecture
- Negative approach of the local community of not benefiting from local revenues
- Searching for unsustainable projects because lack of awareness on beneficial local resources
- "Karpaz Region, Control and Development Ordinance" constituting a bad example by planning the mass tourism just outside the DNP Area



- Proposal of some universities to establish their preparatory schools within the DNPA
- Improper usage causing degradation of the Area's ecosystem
- Realization of mass tourism projects at the buffer zone of the DNPA
- Fishing loosing its economic importance as a local economic activitity

Strengths describe the key assets of the area that offer some basis upon which community-based ecotourism development is dependent. An important asset of the region is diversity of natural and cultural resources together with rural socio-economic characteristics which provides a favorable environment for balancing protection of environmental resources with the development of tourism. Weaknesses identified for the DNPA mainly covers the lack of institutionalization that prevents structured and organized actions for the establishment of the internationally renowned park area.

Identification of opportunities indicates the potential sources of future benefits. In Dipkarpaz National Park Area there are opportunities for economic growth, more jobs, socio-cultural development, diversification of ecotourism business and biodiversity, but these opportunities depend on or could be achieved after weaknesses mentioned above will overcome.

Threats mainly concerned with the executive body decision making process that turned to be damaging tools and measure instead to be protective for DNPA. Thus, political commitment at the government level could avoid threats to environmental, social and cultural values for both to the Area and local people.

WHAT IS TO BE DONE? / RECOMMENDATIONS

- To initiate legal and administrative framework in order to establish a national park according to the criteria of IUCN and EU.
- A Master Plan for the DNPA should be prepared
- Essential management plans should be prepared for the resource management of the Area
- Local Community should become aware about National Park Area and Community-based Ecotourism
- Sustainable management of the natural, historical and archeologic sites should be provided
- The baseline resources of the National Park Area and the Area defined by "Karpaz Region, Control and Development Ordinance" should be determined.
- Calculation of economic, physical, social and environmental carrying capacities
- "Karpaz Region, Control and Development Ordinance" should be reviewed to regulate the provisions supporting mass tourism



- Practices at the "Karpaz Region, Control and Development Ordinance" jurisdiction area should immediately be stopped
- A buffer zone should be established beteweeen DNP Area and "Karpaz Region, Control and Development Ordinance" Area.
- Funds that support the application of Community-based Ecotourism Project in the Area should be provided
- Local people should be educated on the sustainability of the resources of the Area
- NGOs should be involved with the Community-based Ecotourism Project in order to get their support in helping to other stakeholders
- Tourists should be educated through special awareness programs
- Lessons from good and bad practices should be on the agenda of all stakeholders
- Local culture and environment should be a part of the national education programme
- Tuna fishing should become one of the local economic activities run by local community
- Encouring planning and construction of eco-lodge in the DNP Area
- Empowerment of local community for participation to the decision making and planning processes that would direct the future of the region.
- Code of ethics for local community, visitors, tour guides and operators and investors should be produced

LAST WORDS

The Dipkarpaz National Park Area has an abundance of natural resources, scenic areas, and historical and archaeological values that would attract an increasing number of ecotourists. The income from these ecotourists can provide the financial justification for protecting the biodiversity and the local communities of the Area. Yet community-based ecotourism potential of the Area presents two challenges to consider. First, to prevent the development pressures of mass tourism circles and second, to create awareness for the local people that they could act as ecotourism entrepreneurs so that they can become advocates for conservation. The best outcome of this approach is that communities preserve both their environment and their own culture in the process. To summarize, Community-based ecotourism could be a catalyst for economic, social and environmental development in northern part of Cyprus that local communities and natural environment and environmental protection.


REFERENCES:

Ceballos-Lascurain, H. 1996. Tourism, Ecotourism and Protected Areas. IUCN, Gland (Switzerland).

Dreghorn, W. 1978. Landforms in the Girne Range - Norhthern Cyprus. The Mineral Research and Exploration Institute of Turkey. Ankara (Turkey).

Flint, P., Stewart, P. (1983) The Birds of Cyprus, Second Edition. British Ornithologists' Union, Dorset Press, Dorchester (UK).

Godley, B.J., and A.C. Broderick, (1994), Glasgow University Turtle Conservation and Expedition To Norhtern Cyprus 1994: Expedition Report. Glasgow University Veterinary School, Glasgow (Scotland).

Kettaneh, M.S., et. al. 1988. Zafer National Park (Karpaz Peninsula). Department of Forestry and Environmental Protection, Nicosia (Cyprus).

Kusetogullari, H. 2006. Marine Turtle Conservation and Protection Project. Report prepared for Department of Environmental Protection, Nicosia (Cyprus).

Oztek, E. 2005. Karpas National Park: Existing Situation, Analysis and Proposals. Report prepared for the seminar on "Protected areas in Karpas Region" organized by the Management Centre with support from the UNDP Partnership for the Future Programme funded by the European Union, Nicosia (Cyprus).

Russo, A.R. 1994. Epifauna Living on Sublittoral Seaweeds Around Cyprus. Fulbright Research for Cyprus Department of Fisheries, Ministry of Agriculture, Nicosia (Cyprus).

Schatti, B., and H. Sigg. 1989. *Die* Herpetofauna der Insel Zypern. Teil 1: Die Herpetologische Erforschung/Amphibien.-Herpetofauna 11(61): 9-18.

TRNC Printing Office. "Karpaz Region Control and Development Ordinance", Official Gazette, No: 118, August 12, 2004

UNDP. 1970. Survey of Groundwater and Mineral Resources-Cyprus. Technical Report Prepared for the Government of Cyprus by the *UN*. New York, (USA).

UNDP-PFF. 2006. Baseline Study on the Environmental Conditions of the Karpaz Peninsula in the Northern Part of Cyprus. Report prepared by Nature Conservation Centre, (Ankara), Nicosia (Cyprus).

USAID-CYPRUS. 2006. FAA Biodiversity Analysis. Report Prepared by DevTech Systems, Inc. under an EPIQ II subcontract to PA Consulting, Nicosia (Cyprus).

Yuksel, D. 1996. Environmentally Sustainable Management Plan For the Proposed Karpaz Peninsula National Park Area. Unpublished Ms.Thesis. European Masters Degree Course In Environmental Management, University Of Ankara, Ankara (Turkey).

Yuksel, D. 1997. "Ecotourism: An Element of Environmental Paradigm in Achieving Sustainable Society." Keynote Speech at Regional Alumni Conference on Eco-Tourism, organized by Hubert H. Humphrey Alumni Association of Turkey, 28-31 May 1997 Istanbul (Turkey).

WWF. 1989. Marine Turtles - Northern Cyprus: Status Survey and Recommendations for Conservation. WWF Project 3852, Nicosia (Cyprus).

WWF International , 2001. Guidelines for Community-based Ecotourism Development. Guideline prepared by Dr Richard Denman, The Tourism Company, UK-based tourism consultancy, Ledbury (UK).



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



ECOSAN AS A RECYCLING/RECOVERY/REUSE APPROACH AND A SUGGESTION FOR THE PROCESSING OF SEPARATELY COLLECTED URINE FOR AGRICULTURAL USE

Bilsen BELER BAYKAL

Istanbul Technical University, Department of Environmental Engineering, Istanbul, Turkey, bbaykal@ins.itu.edu.tr

The emerging concept of Ecological Sanitation, ECOSAN, claims that domestic wastewater is not a waste to be discarded but a source to be revaluated through recovery, recycling and reuse. Within that context, domestic wastewater is separated into various fractions at the source of origin as grey water, basically everything except the toilet wastes; yellow water, mainly human urine, and brown water, mainly human feces. Those fractions are considerably different from each other in terms of their characteristics, final reuses and the processing they would need to go through before being used further. Among those fractions, yellow water constituting less than 1 % of domestic wastewater by volume, is suggested for use in agriculture as fertilizer, as it contains over 80 % of nitrogen, and over 50 % of phosphorous and potassium in domestic wastewater. Generally its direct use is recommended after storage, while limited suggestions for indirect use after processing also exist. One possibility for that is ion exchange with clinoptilolite, to concentrate the plant nutrients in urine, specifically ammonium and potassium, on the solid phase and to use the product in turn as a slow release fertilizer. ECOSAN provides not only a new sustainable wastewater management alternative, but also a new concept in the field of recycling/recovery/reuse.

Keywords Ecological Sanitation (ECOSAN), source separated domestic wastewater, yellow water, human urine, agricultural reuse, ion exchange, natural zeolites, clinoptilolite, recycling/recovery/reuse.

INTRODUCTION

The concept of sustainability has come to find a significant attention in the world agenda since the end of the second millennium and is a candidate to continue to be so in the third millennium as well. Within that context, in addition to the abatement of pollution and protection of the environment, controlled use of natural resources have become primary issues. The latter in turn, has given rise to increasing concern over recycling/recovery/reuse research and practice which has lead to a search for the revaluation of wastes of different kinds.

Ecological Sanitation, abbreviated as ECOSAN, is one of the emerging concepts of wastewater management in the recent years, claiming that domestic wastewater is not a waste to be discarded but a source to be revaluated through recycling, recovery and reuse. Within that context, domestic wastewater is separated into various fractions at the source of origin, each of which is to be processed further to be recovered and reused, thereby lending an alternative route towards sustainability.



Among those fractions are grey water, mainly the stream from kitchens, bath tubs, wash basins, laundry, etc., basically everything except the toilet wastes; yellow water, mainly separately collected human urine; and brown water, which are mainly human feces. It is apparent that each of these fractions are considerably different in terms of their characteristics, especially constituents and pollution potential, and the processing they need to go through before being used further. Each of those streams is recommended for different final recycling/recovery/reuse practices and for different end uses.

ECOSAN is a concept which has its basis in source control through effective source separation and subsequent processing of the separated fractions for further use. As such, it is generally comprehended as a means of sustainable domestic wastewater treatment, however, due to the revaluation it suggests, it is also a new approach for recycling, recovery and reuse. Hence ECOSAN is not only a new sustainable wastewater management alternative, but also a new concept in the field of recycling/recovery/reuse for future research and practice.

Grey water, constituting about 75 % of domestic wastewater by volume, is the fraction with the lowest potential for pollution. The typical processing suggested for that fraction is directed mainly to the reduction of organic matter in constructed wetlands or biofilms, and the treated effluent is recycled back into the water cycle, in various forms of water reuse including irrigation and ground water recharge. On the other hand, brown water with a considerably higher pollution potential is generally directed into anaerobic systems for biogas generation and/or for possible end use as a soil conditioner.

Yellow water, basically urine constituting less than 1 % of domestic wastewater by volume, is suggested for use in agriculture as fertilizer, as it contains over 80 % of the nitrogen, and over 50 % of phosphorous and potassium in domestic wastewater. Frequently, its direct use is recommended after storage, generally for several months, while more limited suggestions for indirect use after more elaborate processing also exist. One possible process to be suggested within those lines is ion exchange with the natural zeolite, clinoptilolite, to concentrate the active elements of fertilizers in urine, namely ammonium and potassium, on the solid phase and to use that in turn, as a slow release fertilizer in agriculture.

This paper aims to present an overview of the ECOSAN approach with specific emphasis upon how it can be used as a route of recycling/recovery/reuse. Furthermore, a suggestion for the revaluation of yellow water will be presented based on ion exchange with clinoptilolite for the indirect use of human urine in agriculture, together with preliminary results regarding the suggestion.

THE ECOSAN APPROACH AS A NEW DOMESTIC WASTEWATER MANAGEMENT CONCEPT AND DOMESTIC WASTEWATER FRACTIONS

ECOSAN, advocating that domestic wastewater is not a waste but a source to be revaluated, is a concept which is based upon source control through effective separation of domestic wastewater fractions at their points of origin, and subsequent processing of the separated fractions for further use. A significant implication of the ECOSAN approach is the closing of material cycles [1].



Within this context, domestic wastewater is segregated into three main streams, namely the grey water, the yellow water and the brown water as the wastewater fractions, and each fraction is considerably different from each other in terms of quantity and composition of their constituents as shown in Figure 1.

Grey water is practically all of the domestic wastewater except that which comes from the toilets, i.e. wastewater from kitchens, wash basins, bath tubs, laundries, etc., constituting about 75 % of domestic wastewater by volume. It contains about 40 % of the total COD and 30 % of potassium but less than 10 % of phosphorous and nitrogen. Although it holds the largest portion by volume by far, it is the fraction with the lowest potential for pollution.

Brown water is mainly separately collected human feces. With about 50 % of COD and 40 % of phosphorous in conventional domestic wastewater, it is the richest fraction in terms of organic matter and phosphorous.

Yellow water is basically source separated urine constituting less than 1 % of domestic wastewater by volume. As it contains over 80 % of the nitrogen and over 50 % of both phosphorous and potassium in domestic wastewater yellow water is the fraction which holds the majority of the plant nutrients.

One important issue to be considered with domestic wastewater is the microbiological safety. With source separated streams, the greatest majority of pathogenic microorganisms will reside in brown water. The amount of pathogens in yellow water is very low in comparison to brown water, and even lower in grey water.

With the different constituents, compositions and characteristics, each fraction is suggested for different types of processing and final end use to match their characteristics. Figure 2 presents a summary of those suggestions. As can be observed from the Figures 1 and 2 each fraction exhibits considerable differences regarding their constituents, sources, pertinent processing and final end use.

As a new approach in domestic wastewater management leading to recovery, recycling and reuse, it has to be kept in mind that the ECOSAN necessitates the use of special nonconventional sanitation system layouts where the three streams can be separated during toilet use and provisions for separate holding tanks must be provided. A number of different toilets for the task have been designed for this purpose including the urine diverting toilets and the dry toilets. Moreover, conventional domestic wastewater treatment systems would have to be revised if not redrawn with the adoption of the ECOSAN approach.





Figure 1- Segregated domestic wastewater streams (generated based on data given in [2])



ECOSAN AS A NEW APPROACH TO RECOVERY/RECYCLING/REUSE

Besides being a new sustainable wastewater management alternative, ECOSAN also lends a new concept in the field of recycling/recovery/reuse both for research and for practice.



Figure 2. Fractions of domestic wastewater (Based on [3])

Each fraction of domestic wastewater possesses different constituents and compositions which actually dictate the processing they will have to get together with their further reuse areas. As indicated in Figure 2, the typical processing suggested for grey water is directed mainly towards the reduction of organic matter it contains to be recycled back into the water cycle in various forms of water reuse including irrigation and ground water recharge. Grey water constitutes the largest percentage of water by volume, over 75 %, and its nutrient content is relatively low. The valuable material to be reused further in this case is water itself. The most critical pollutant to be treated in this stream is the organic matter and widely suggested systems for the treatment of organics therein are constructed wetlands or biofilm columns. Brown water which constitutes an extremely small part by volume is the richest and the most concentrated stream in terms of organic matter. Organics therein are actually revaluated and converted to biogas or soil conditioner in subsequent processing. As such, rather than being degraded to carbon dioxide and water in conventional treatment plants, organics are revaluated to be reused further either as a source of energy or as some agricultural aid. Brown water is generally directed into anaerobic systems for biogas generation for possible end use and/or as a soil conditioner.



Yellow water on the other hand, is the richest stream in terms of nutrients with up to above 80 % of the nitrogen and over 50 % of the phosphorous and potassium in domestic wastewater. Those three constitute the active materials of plant nutrients which are used in agricultural fertilizers hence the end use of yellow water is suggested as fertilizer. As such, the plant nutrients in urine are recovered and reused as the valuable matter in this fraction. More frequently, the direct use of urine on agricultural fields has been applied following a storage period long enough to kill the pathogens. Dilution is also frequently done before direct use. Once again, rather than being degraded at considerable costs in conventional domestic wastewater schemes due to their undesirable impacts lead by eutrophication, nutrients in human urine are reused in agriculture for a very fruitful reason. Within the context of ECOSAN, separation of urine from the rest of the domestic wastewater and the use of source separated nutrient rich urine in agriculture as fertilizer is one of the foremost advocations [4-10].

THE USE OF SEPARATELY COLLECTED URINE FOR AGRICULTURAL PURPOSES AND A SUGGESTION FOR THE INDIRECT USE OF URINE IN AGRICULTURE

Yellow water consisting mainly of source separated urine makes up less than 1 % of the total volume of domestic wastewater, however the most significant portion of nutrients therein are concentrated in this fraction. Human urine holds about 80 % of the total nitrogen, and over 50% of phosphorous and potassium in domestic wastewater. Due to this property of yellow water, its further use as plant fertilizer in agriculture has been suggested, and as a matter of fact practiced in a number of occasions.

From the perspective of conventional domestic wastewater treatment schemes on the other hand, nitrogen treatment units like nitrification and denitrification may be avoided just through the separation of urine from the rest of the domestic wastewater. This actually is a revolutionary consequence considering the efforts and expenditure devoted to those units. More precisely, if urine is to be separated at the source widely, research and practice in terms of nitrogen control should be diverted from nitrogen removal from more dilute nitrogenous solutions like the conventional domestic wastewater to nitrogen recovery from more concentrated ones like urine. That is, first the research efforts should change their objectives followed by pertinent practice of nitrogen recovery in actual systems.

Due to its rich plant nutrient content, yellow water is directed to reuse for agricultural purposes. The use of urine in agriculture has been a subject of considerable work both in terms of research and in terms of practice in the recent years. Most of that work had been devoted to the direct use of urine. Within that context, separately collected urine is generally stored after collection with the primary objective of the destruction of pathogens.

In most of the work concerned with microbiological safety, storage times of up to six months are recommended. An example of that type of work was given by Hoglund [11] who had pointed at the significance of hygienic safety with such practice and after a comprehensive survey of bacterial die off, six months of storage of source separated urine was recommended for the cessation of pathogenic action of all possible pathogens.



Following the storage period, urine is introduced into the agricultural fields directly, with or without dilution. It had been reported in the literature that the direct application of urine in agriculture had given comparable results with synthetic fertilizers [12]. Other researchers had demonstrated that urine must be diluted prior to application and recommended dilutions as high as 30 % indicating that at more concentrated concentrations benefits of using urine are lost [7].

On the other hand, there are papers in the literature drawing attention upon the possible introduction of pharmaceuticals and hormones into soil and crops due to the direct application of urine onto agricultural fields and that their fate and impact are to be investigated. Wide spread and widely accepted limits or guidelines are not yet available at this time, however, some suggestions on the subject matter regarding the practice were given by Vinneras et. al. [13]. These are open areas of research which will have significant consequences upon the practice of recovery and reuse of plant nutrients from source separated urine.

Furthermore, direct application is recommended after several months of storage and the characteristics of urine changes drastically during the storage period, especially due to the hydrolysis of urea. Comprehensive work to investigate the changes in the characteristics of urine during storage under conditions similar to the practical storage conditions in actual practice had indicated that the concentration of ammonium increases up to 20 fold as compared to that of original urine. Additionally, salinity increases highly during the recommended storage period [10, 14], which is a very significant drawback for agricultural use. Moreover, this may make the application of urine even more critical as even fresh urine itself is highly saline. Although less of the research in the field of this new subject matter is devoted to the indirect use, indirect use seems to be beneficial in terms of eliminating the undesirable constituents of yellow water before it is reused for agricultural purposes. Within that context, processing of source separated urine has been suggested to recover the plant nutrients only from urine thereby eliminating undesirable constituents therein. Among those processes suggested are the indirect reuse following chemical treatment like struvite precipitation [15] and the recovery of plant nutrients through transferring them onto the natural zeolite clinoptilolite to use the product in the agricultural fields subsequently [5, 6, 8, 9, 10, 14]. Indirect use after processing to recover nutrients is definitely another wide area of research.

The natural zeolite clinoptilolite is known for its high selectivity for ammonium ion in addition to potassium in the process of ion exchange. The capacity of clinoptilolite for the removal of ammonium from conventional domestic wastewater had been the subject of several pieces of work [16 - 22]. Likewise, the ability of clinoptilolite to adsorb potassium was also demonstrated [14].

A good alternative for the recovery and reuse of plant nutrients in urine is envisaged to be loading the clinoptilolite, which is normally used in agriculture as soil conditioner, with ammonium and potassium through ion exchange, and to use the product in agriculture as a slow release fertilizer. As was indicated earlier, the concentration of ammonium was observed to increase up to 20 fold of that of original urine due to the conversion of urea. This is a very significant advantage for processing of urine with clinoptilolite.



Laboratory experiments have indicated that over 95 % of the ammonium can be removed from urine through ion exchange with clinoptilolite and up to about 90 % of the ammonium on the solid phase can be released into the liquid phase upon subsequent washing with tap water [6, 8, 14]. Those results have provided solid evidence that the suggested route can lead to a product which may be used in agricultural fields as a slow release fertilizer, from what is conventionally a waste, urine, through a pertinent process of recovery. Recovery of potassium through the same route was also highly satisfactory [14]. Previous work has additionally indicated that the significant drawback for agricultural use, high salinity of fresh urine which increases to even higher levels during the storage period, may be overcome by the use of the suggested process. Recovery of plant nutrients via ion exchange on clinoptilolite had been shown to be very helpful within this respect as well while the salinity imposed on the agricultural fields goes down to much lower levels than that of original urine to match with irrigational water standards after such treatment [6, 8, 10, 14]. Based on those results, trial of the product in actual agricultural fields is definitely recommended.

CONCLUDING REMARKS

The emerging domestic wastewater management approach ECOSAN claims that domestic wastewater is not a waste to be discarded but a source to be revaluated. Based on the source separation of various domestic wastewater streams via non-conventional collection systems and infrastructure followed by pertinent processing for the recovery of "valuable material" therein for further reuse, this new concept lends a promising approach both for sustainable domestic wastewater management, and for the recovery, reuse and recycling practice. Within this context, domestic wastewater is reused and revaluated as fertilizer, soil conditioner, irrigational water, groundwater recharge supply, etc. after segregated collection and processing of its fractions, namely the grey water, the yellow water, and the brown water. Adoptation of such an approach will necessitate the revision of current conventional sanitation and treatment systems, and a new layout for new settlements to be developed. It seems that although rebuilding current systems totally in highly populated cities in the short run may not be very realistic, the ECOSAN concept may easily be used as the wastewater management approach in new settlements and rural areas. One important application regarding recycling/recovery/reuse in relation to the ECOSAN approach is the reuse of plant fertilizers in yellow water which is mainly source separated urine. The application of urine in agriculture may be done through direct or indirect routes both of which are open to laboratory and full scale research. In terms of direct application, the fate of pharmaceuticals and hormones in soil and in the crops exposed are yet to be investigated along with hygienic safety and the effects of dilution. With indirect use, among other processing proposals, transfer of plant nutrients in urine onto the natural zeolite clinoptilolite through ion exchange and the subsequent use of the product in agriculture as a slow release fertilizer lends a promising alternative. As such, practically all of nitrogen and potassium may be recovered and reused possibly eliminating the undesirable constituents in urine lead by the elimination of the salinity hazard. Finally, the ECOSAN approach is not only a new sustainable wastewater management alternative, but also a new concept in the field of recycling/recovery/reuse for future research and practice.



REFERENCES:

[1] Jonsson, H. The role of ECOSAN in achieving sustainable nutrient cycles, IWA 2nd International Symposium on Ecological Sanitation,

Lubeck, Germany, April 7-11, 2003; C.Werner, et. al. Eds.; Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH Pub.: Eschborn, Germany, 2004.

[2] Otterpohl, R.; Braun, U.; Oldenburg, M. Innovative technologies for decentralized waterwastewater and biowaste management in urban and peri-urban areas.

Water Science and Technology 2003, 48(11), 23-31.

[3] Werner, C.; Fall, P. A.; Schlick, J.; Mang, H. P. Reasons for and principles of Ecological Sanitation, IWA 2nd International Symposium on Ecological Sanitation,

Lubeck, Germany, April 7-11, 2003; C.Werner, et. al. Eds.; Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH Pub.: Eschborn, Germany, 2004.

[4] Fittschen, I.; Hahn, H. H. Characterization of the municipal wastewater part human urine and a preliminary comparison with liquid cattle excretion.

Water Science and Technology **1998**, 38(6), 9–16.

[5] Beler Baykal, B. Ion exchange with clinoptilolite: a potential alternative for ammonia recovery from wastewater, IWA 2nd International Symposium on Ecological Sanitation,

Lubeck, Germany, April 7-11, 2003; C.Werner, et. al. Eds.; Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH Pub.: Eschborn, Germany, 2004.

[6] Beler Baykal, B.; Bayram, S.; Akkaymak, E.; Cinar, S. Removal of ammonium from human urine through ion exchange with clinoptilolite and its recovery for further reuse.

Water Science and Technology **2004**, 50(6), 149-156.

[7] Pinsem, W.; Sathreanranon, K.; Petpudpong, K. Human urine as plant fertilizer: trial on pot basil, Proceedings of the International IWA Conference on Wastewater Treatment for Nutrient Removal and Reuse, Presentation Preprints Vol:II,

Bangkok, Thailand; January 26-29, 2004; Asian Institute of Technology, Thailand, 2004.

[8] Beler Baykal, B.; Balkanay, C.; Bayram, S. A preliminary investigation for the indirect use of human urine for agricultural purposes, 1st IWA – ASPIRE (Asia Pacific Regional Group) Conference,

Singapore, July 10-15, 2005: Abstract Book + CD-ROM 2005.

[9] Ganrot, Z. Urine processing for efficient nutrient recovery and reuse in agriculture. PhD Thesis, Goteborg University, Department of Environmental Science and Preservation, Sweden, 2005.

[10] Beler Baykal, B.; Bayram, S. An appraisal of the use of human urine in agriculture, IWA/IWWA 9th International Conference – ECOSAN India, Conference Documentation,

Bombay, India, 25-26 November 2005; Indian Waterworks Association Pub.: Mumbai, India, 2005.

[11] Hoglund, C. Evaluation of microbial health risks associated with the reuse of source separated urine. PhD Thesis, Royal Institute of Technology, Department of Biotechnology, Sweden, 2001.

[12] Simons, J.; Clemens, J. The use of separated human urine as mineral fertilizer, IWA 2nd International Symposium on Ecological Sanitation,

Lubeck, Germany, April 7-11, 2003; C.Werner, et. al. Eds.; Deutsche Gesellschaft für



Technische Zusammenarbeit (GTZ) GmbH Pub.: Eschborn, Germany, 2004.

[13] Vinneras, B.; Jonsson, H.; Salomon, E.; Stintzing, A. R. Tentative guidelines for agricultural use of urine and faeces, IWA 2^{nd} International Symposium on Ecological Sanitation,

Lubeck, Germany, April 7-11, 2003; C.Werner, et. al. Eds.; Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH Pub.: Eschborn, Germany, 2004.

[14] Bayram, S. The use of clinoptilolite for the recovery of fertilizer material from separately collected urine. Master's Thesis, Istanbul Technical University, Institute of Science and Technology – Environmental Engineering Program, Istanbul, Turkey, 2005.

[15] Kabdasli, I.; Tunay, O.; Islek, C.; Erdinc, E.; Huskalar, S.; Tatli, M. B. Nitrogen recovery by urea hydrolysis and struvite precipitation from anthropogenic urine.

Water Science and Technology 2006, 53(12), 305-307.

[16] Koon, J.H.; Kaufman, W.J. Ammonia removal from municipial wastewater by ion-exchange.

Journal WPCF **1975**, 47(3), 448-465.

[17] Hlavay, J.; Vigh, G.; Olaszi, V.; Inczedy, J. Investigations on natural Hungarian zeolite for ammonia removal.

Water Research **1982**, 16, 417-420.

[18] Beler Baykal, B.; Oldenburg, M.; Sekoulov, I. The use of ion exchange in ammonia removal under constant and variable loads,

Environmental Technology 1996, 17, 717-726.

[19] Beler Baykal, B.; Akca Guven, D. Performance of clinoptilolite alone and in combination with sand filters for the removal of ammonia peaks from domestic wastewater. Water Science and Technology **1997**, 35(7), 47-54.

[20] Beler Baykal, B. Clinoptilolite and multipurpose filters for upgrading effluent ammonia quality under peak loads.

Water Science and Technology **1998**, 37(9), 235-242.

[21] Nguyen, M. L.; Tanner, C. C. Ammonium removal from wastewaters using natural New Zealand zeolites.

New Zealand Journal of Agricultural Research 1998, 41, 427-446

[22] Hedstrom, A. Ion exchange of ammonium in zeolites: a literature review. Journal of Environmental Engineering **2001**, August, 673-681.



SUSTAINABLE CRITERIA IN MINERAL PROCESSING

M.Zeki DOĞAN; A.Ekrem YÜCE; Caner ZANBAK

Istanbul Technical University, Faculty of Mines Mineral and Coal Processing Section, İstanbul - Turkey yucea@itu.edu.tr

In this paper, sustainable criteria in mineral processing are discussed with respect to comminution, pre-concentration, automatic sorting, flotation, slurry transport of mineral concentrates and in-situ mining. In-situ mining appears to fit into the picture of future mining and minerals processing as no pit, no subsidence, no tailings, no waste and no fill

1. INTRODUCTION

The most accepted definition of sustainability comes from Bruntlandt Committee [1]. Development that meets our needs of the present without compromising capability of future generations to meet their own needs. Willas Boas [2] defined sustainable development targets as follows:

Minimization of energy expenditure, Minimization of materials consumption, Minimization of environmental impacts, Maximization of social satisfaction.

When first three items are materialized, social satisfaction will be met due to the economic benefit. The study of sustainability in mineral processing will be carried out by analyzing beneficiation methods in view of energy expenditure, materials consumption and environmental impacts. In this paper, sustainable criteria in mineral processing are discussed as follows:

- i. Comminution i.e., size reduction (crushing, and grinding),
- ii. Pre concentration,
- iii. Automatic sorting
- iv. Flotation and use of recycle waters in flotation
- v. Slurry transport of flotation (process) concentrates.
- vi. In-situ mining.
- vii. Gold leaching.



2. SUSTAINABLE CRITERIA IN MINERAL PROCESSING

2.1. Comminution

In mineral processing, the majority of expenditure comes from size reduction, mostly in grinding. Autogenous and semi autogenous grinding still keep popular position in comminution where only primary crushing is used without secondary and tertiary crushing. Recently, in fine and ultra fine grinding, three types of stirred mills, namely, Tower mill, Isa mill and Detritor mill are commonly applied in minerals industry. High pressure grinding rolls are introduced as energy efficient mills in 1980 and used widely in cement industry. Further development of stirred mills is critical to broaden their applications in the minerals industry. One of the challenges is to use stirred mills to economically produce products below five microns at high mill throughput [3].

High pressure grinding rolls are used mainly in the primary materials industries especially for grinding raw materials and cement clinker. It became possible to achieve energy saving up to 50% compared to conventional comminution processes with ball and SAG mills [4]. Today's high capacity autogenous grinding (SAG) mills expand vast amount of energy and in doing so consume tons of shell liners and steel balls, while processing ore. A case study done on a 26 x 12,5 ft SAG mill showed that a 12% reduction in energy consumption could be achieved by proper design of shell liners and discharge systems [5].

2.2. Pre concentration

Mining and beneficiation costs of low grade ores become prohibitive as the cost of grinding before flotation make the process uneconomical. In this respect, pre concentration becomes indispensable through pre concentration; the large part of the ore is discharged as clean tailings. Whereas, smaller proportion of the remaining ore is ground to flotation size, resulting in considerable saving in energy expenditure. In a paper by Gül and Onal, pre concentration study of three different low grade copper ores from Ergani-Anayatak, Murgul – Çakmakkaya and Küre – Aşıköy having 0,53, 0,28 and 0,48% Cu respectively was carried out where pyrite and chalcopyrite minerals were economic minerals while diabase, quartz and calcite being gangue minerals. Ore samples were crushed below 9 mm and then subjected to float and sink tests where bromoform and tetrabromethane were used as heavy medium. The discarded tailings contained 0,08 – 0,04% and 0,05% Cu respectively whereas coarse copper concentrates with 0,48-0,82% Cu content were obtained with over 90% recoveries [6, 7].

When liberation size takes place in coarse size before final concentration, pre-concentration must be investigated from economic and technical points of view. The most important parameter is the amount tailings to be removed. It is obvious that, cost of pre-concentration, is the function of concentrate price and metal production costs. When the economic viability of pre-concentration is concerned, the closest approach was made by Bergmann [8]. According to Bergmann, the limit of economic viability is a function of tailings to be removed by pre-concentration.



A research study was conducted using low grade lead and zinc ore to prove economical viability of pre concentration and Bergmann approach was also evaluated at the end of test results. As an alternative to selective flotation presently practiced in the plant, pre-concentration was made so that tailings in coarse size were discarded having low metal values. Consequently evaluation was made on this process. According to the results of pre-concentration tests on -6mm crushed ore, it was possible to discard tailings of 29,3% of the run of mine, having 0,71% Pb, 0,22% Cu and 1;31% Zn. In this way, it was readily seen to have economic advantages [8].

2.3. Automatic Sorting

The implementation of automatic sorters has substantially changed processing in recycling industry. In the state-of the art recycling plants for glass, plastics or metals, sorter are the core of separation process. In contrast with the minerals industry sorters are only applied in specific areas. Automatic sorters have been used successfully for the processing of industrial minerals like calcite, rock salt or talc, as well as for uranium ore sorting, diamonds and other gemstones.

Sorters can be used in pre concentration. The elimination of waste at any cost less than the total mining cost will show profit. Sorting can provide efficient pre concentration, where traditional techniques providing a more compact, dry processing method.

The advantages of sorters for various steps of mineral processing, from pre concentration of plant feed to finished product applications are so convincing that the industry should have greater interest in further development and application [10].

2.4. Flotation and Use of Recycle Waters in Flotation

In flotation, the improvement was achieved by increasing the size of flotation cells from 25 cu.ft to 300 cu.ft to save energy and space.

In flotation, for neutralization of activating action of salts of alkaline earth metals, gangue silicate minerals with oxyhydrillic collectors, sodium carbonate, phosphate compound or soluble glass are used. Prevention of flotation of one of major silicate minerals, namely, quartz will be provided in conditions by the following equation;

$$Log [CaOH^+] = 5,56 - pH$$

For precipitation of calcium salts, sodium carbonate $C_p^{\ c}$ or sodium phosphate $C_o^{\ p}$ are used. The concentration of calcium bearing ions is determined by conditions of their equilibrium with the calcium carbonate or calcium phosphate precipitates. The equation;

 $C_o^c = f(pH)$ or $C_o^p = f(pH)$ derived can be used in automation systems for regulation of the consumption of a reagent used for precipitation of calcium salts in recycle waters or in flotation pulps [11].



2.5. Slurry Transport of Flotation (Process) Concentrates

The long distance transportation of solids in pipes, sometimes over hundreds of kilometers like coal, sand, salt and mineral concentrates will be accomplished by using water, because it is incompressible and the slurry velocity doesn't increase at decreasing pressure along the pipe. Hydraulic transport is used in Turkey for transport of copper and pyrite concentrates from Murgul to Hopa in Black Sea Coast. Several current plants for coal transport in USA and Russia, for gold in South Africa, for sand salt in Germany [12].

2.6. In-situ Mining

Chemical or in-situ mining is in place extraction of metals from ores located within the boundaries of a deposit or a mine (un-fractured or fractured ore, stopped fill, caved material and ores in permeable zones), low-grade mineral deposits [13].

Presently, in-situ mining has been more or less limited to the extraction of evaporates (trona and halides), copper, gold, silver, sulphur and uranium from low grade ores; however, it has a much greater potential. Practically, all metals are susceptible to leaching in-place environment. Techniques will soon be developed for in-situ extraction and recovery of metals such as zinc, nickel, manganese, molybdenum and aluminum [13].

Batterham and Mondagie [14] outlined some of the characteristics of the mine of the future as follows;

- Limited surface disturbance during mining as the mineralization will be deep underground.
- Undisturbed land use as there will be no pit, no subsidence, no tailings, no waste and no fill.
- Automated, in place extraction (in-situ leaching) techniques such as solution (chemical) mining and hence much safer operations.
- Considerably more cost effective with significant reductions in mine development, ore transport, comminution and beneficiation.

It is clear that drastic changes are not necessary to achieve the sustainable mine of the future and in-situ mining will contribute greatly for this target.

2.7. Gold Mining in European Union (EU)

There has been gold production in Europea on an industrial scale for more than three thousand years. By 1994, gold mine development was being actively pursued in more than 15 countries within Europea as a whole, with active Governmental support. New permits for gold operation have been issued in the UK, Sweden and elsewhere, and new exploration programs actively undertaken. Opertaions such as Furthei in Sardinia, Rio Narcia in Spain and Ovacık in Turkey have been developed during last decade and are now in full production.



All the mines included will be or have been operating under criteria which accord with the EU Waste Framework Directive or, where appropriate, are in full compliance with local waste management regulations. Further, the majority has operating permits and thus has received approval not only for the process technology to be adopted, but also for waste disposal, tailings confinement, effluent control and, where appropriate, consent limits for emission to air and water. Main segment of gold processing is either carbon in leach (CIL) or carbon in pulp which are conventional and well-proven technologies. All the operations involving cyanidation include or plan to include, a detox system. The wastes arising from these mining operations are all discharged to purpose- built tailings disposal facilities constructed and monitored in accordance with internationally accepted BAT (Best Available Technologies) practice. Nearly all of the tailings management facilities operate with a closed circuit and under a zero controlled release regime [15].

3. CONCLUSION

Mineral extraction is not in conflict with the principles of sustainability. Indeed, both economic development and environmental performance may in the long term be better served by having a properly regulated mineral processing industry. Review of mineral processing methods regarding the environmental impacts has shown that the efforts to achieve the environmental foot-print to a minimum have given fruitful results. Especially, in-situ mining offers a great potential for environmental compability.

REFERENCES:

[1] Brundtlandt, the World Commission on Environmental and Development, Our Common Future, Oxford University Press, 1987.

[2] Villas Boas, R.C., XXth IMPC Proceedings, Aachen, Germany, 1997.

[3] Gao, M., Holmes, R., Pease, J., The latest Development in Fine and Ultra fine Grinding Technologies (Plenary), XXIII. IMPC, 3-9 September, 2006, İstanbul, Turkey, ISBN: 975-7946-27-3, Vol:1, pp:30-37.

[4] Unland, G., Kleeberg, J., The Normal Code on Roll Surfaces of High Pressure Grinding Rolls, XXIII. IMPC, 3-9 September, 2006, İstanbul, Turkey, ISBN: 975-7946-27-3, Vol:1, pp:133-138.

[5] Rajamani, R.K., et al., Energy Reduction in Semi Autogenous Grinding Mills via the Design of Mill Internals, , XXIII. IMPC, 3-9 September, 2006, İstanbul, Turkey, ISBN: 975-7946-27-3, Vol:1, pp:98-102.

[6] Gül, A., Önal, G., Evaluation of Low Grade Copper Ores by Pre Concentration, Proceedings of the 9th Balkan Mineral Processing Congress, 11-13 September 2001, İstanbul, Turkey, pp: 681-685

[7] Gül, A., Önal, G., Pre Concentration of a Low Grade Sülfidic Copper Ore From Murgul Çakmakkaya Region of Turkey, XXI. IMPC, Rome 2000, Vol:C, pp:C10-1 C10-4.

[8] Bergmann, A., Übersicht über die aufbereitunstechnische Verfahren zur Anreicherung von Zink und ihre Probleme, 1969, Erzmetall, 9, 419-423.

[9] Yüce, A.E., Ünsal, S., Doğan, M.Z., Gürkan, V., Pre-concentration of sulphidic complex ores and pre-feasibility evaluation through Bergmann approach, Doğu Karadeniz Bölgesi Maden Kaynaklarının Değerlendirilmesi Sempozyumu, 14-16 Eylül 2006, Trabzon,



[10] Wotruba, H., Sensor Sorting Technology- Is the Mineral Industry Missing a Change?, XXIII. IMPC, 3-9 September, 2006, İstanbul, Turkey, ISBN: 975-7946-27-3, Vol:1, pp:21-29.

[11] Abramov, A.A., Russian Perspective in Indicator of Sustainability for the Minerals Extraction Industries, A Review on Indicators of Sustainability for the Mineral Extraction Industries, Edts: Villas-Boas, Shields, Solar, Anciaux, Önal, CYTED 2005, ISBN: 85-7227-222-4, pp:209-226.

[12] Dedegil, M.Y., Transportation of Bulk Solids in Pipes, XXIII. IMPC, 3-9 September, 2006, İstanbul, Turkey, ISBN: 975-7946-27-3, Vol:3, pp:2023-2027.

[13] Dogan, M.Z., Chemical Mining, Lecture Notes, ITU, Faculty of Mines, Mineral Processing Section, September 1985, İstanbul.

[14] Batterham, J.B., Mandagie, M., Australian Perspective on Indicators of Sustainability for the Mineral Extraction Industries, Edts: Villas-Boas, Shields, Solar, Anciaux, Önal, CYTED 2005, ISBN: 85-7227-222-4, pp:131-143.

[15] Cambridge, M., The Sustainability of Gold Mining in Europea, Cantab Consulting Ltd., 2005, 8 pages.



ENVIRONMENTAL ETHICS IN RELATION TO MINING ACTIVITIES

M.Zeki DOGAN,Ali GÜNEY

İstanbul Technical University, Mining Faculty, Mining Eng. Dept. Mineral and Coal Processing Division Istanbul-Turkey yucea@itu.edu.tr

Humankind shares a common environmental and a common ecosphere. Therefore, concern about environmental goes beyond national boundaries. It is appropriate that intellectual professionals of many disciplines started to explore a new applied ethics called environmental ethics. The majority of the environmentalists consider mining activities to be responsible for environmental pollution and damage. Of course, mining operations take place, generally in the inaccessible rural areas where the environment may be affected to a certain degree.

In this paper, the effect of mining however on the environment will be discussed in the following order; Mineral Exploration, Surface Mining Underground Mining, Mineral Processing and In-situ mining.

1. INTRODUCTION

Mineral resources are different from other natural resources due to being non-renewable. Perhaps, it is a good idea to explain it by giving an example. Where a man has a lot of olive growing's, he can obtain olive oil from his olives every year more or less. On the other hand, a miner owner produces his ore at a certain tonnage until the ore in the deposit is depleted. Consequently, an ore deposit is a wasting asset, nothing like and orchard or an agricultural land.

It is inevitable that mining activities many have adverse effects on the environment such as surface topography, subsidence, acid mine waters, surface and underground waters, noise and dust pollution, solid and liquid wastes and tailings from mineral processing plants. These effects may be due to mining and mineral processing characteristics of ore deposit. In order to take measures to prevent them, these affects must be taken into account.

2. MINING ACTIVITIES

Mineral Exploration

Exploration trenches, shafts, tunnels and diamond core drilling are carried out in order to discover mineral deposit and then ore reserves are attempted to be determined. Inevitably, those activities may alter the environment of the prospecting area, resulting in the damage to the surface of the deposit. They are generally related to suitable agriculture and forest areas. But it is difficult to forecast the effects until mineral exploration activities are terminated. Through good planning and control, the affected areas may be kept at a minimum level.



Surface Mining

Surface mining is actually divided into three, namely, open pit mining, open cast mining and quarrying. Open pit mining; where overburden is stripped and transported to a disposal area to uncover mineral deposit. Both stripping and mining are conducted from one or a sequence of benches. Opencast mining is a surface exploitation method, used mainly for coal, which resembles open pit mining but differs in one unique respects; the overburden is not transported to waste dumps for disposal but cast or hauled directly into adjacent mined out panels.

Quarrying: (dimension stone) quarrying produces from a deposit, prismatic blocks of mineral which are both roughly sized and shaped. Quarries resemble open pit mines, but the benches (called faces) are lower and nearly vertical.

To start surface mining (open pit mine and open cast), overburden must be taken from the top of the deposit (coal seam), and this operation is called stripping. In surface mining, panoramic view of the surface is altered after the upper soil is removed. Due to the drainage of the surface water, all the waters may be polluted in the mining areas. When the stripping of the overburden and mining are carried out, noise may take place in addition to dust produced through blasting. These are detrimental to the environment as well as the welfare of the mine workers.

Underground Mining

When the ore body occurs in depth, where the ratio of overburden to the ore body becomes very large. The stripping cost may affect viability of mining operation; then underground mining becomes the only choice.

Underground mining may be done in the range of a few hundred meters up to 3 thousand meters (gold mining in South Africa) in depth. Environmental effects of underground mining may be different in accordance with mining methods selected. To name a few, mining methods can be enumerated as cut and fill, shrinkages stopping, hydraulics stowage and caving methods such as block-caving. The working place, where ore is extracted, is called stope. In coal mining where coal is worn, with the name of coal face.

Subsidence is an environmental hazard of long wall coal mining (1). Depending on the depth of cover and area mined, caving and collapse of the overlying strata will eventually extend from the mining horizon to the surface. Although some damage to the surface must be expected, it can be controlled by maintaining a uniform rate of advance of the long wall and the subsequently caving. If the surface subsidence evenly, then destruction of the structures and water courses need not occur. At one time, resistant support systems comprised of pack walls, cribs, and back fill were utilized in an attempt to prevent or minimize subsidence, but there are rarely utilized to day, having given way to modern yielding supports which control caving and subsidence but not prevent it completely.



During mining operation, acidic mine waters are formed. The origin of acidic mine waters is in two ways. In coal mines, where coal has generally pyritic sulphur or in sulphidic ores, having pyrite, marcasite and chalcopyrite as economic minerals. Pyrite present in coal or country rock comes in contact with air and water. Then oxidation takes place in the presence of bacteria, namely, A. ferrooxidans resulting on the formation of sulphuric acid and ferrous ions. With further oxidation, ferric ions and more sulphuric acid are formed and pH of the medium is lowered to about pH 2.0.

Acidic mine waters coming from coal mines must not be allowed to flow into stream, river and lakes. They must be collected and be kept under control for treatment.

Mineral Processing

In the mineral processing, run-of-mine ore is first subjected to comminution, namely, crushing and grinding. Crushing is a dry process, grinding is generally wet process. Then ground ore is treated by concentration methods, gravity, magnetic separation and electrostatik separation and flotation. Two products are obtained after concentration namely saleable concentrate and tailings. Concentration, especially flotation is generally a wet process so that process water is cleaned and treated before re-cycle. Tailings are sent to a tailing dam. It is neccessery to ascertain physical and chemical properties of tailings; solid/liquid ratio, grain size distribution, specific gravity of solids, composition of ions before constructing tailings dam. The use of special reagents in conditioning of recycle waters and flotation pulps is discussed by Abramov(2) from Russia.

Biological de-nitrification process in total water recycling and reuse was discussed by Shelp(3). Where the nitrogen substance i.e. nitrates and nitrites are reduced to nitrogen gas, such as N_2O and N_2 , using organic carbon as electron donor. It was discovered that waste cellulose solids such as sawdust and leaf compost can provide carbon source for heterotrophic denitrification.

Electronic De- Ionization, namely the Des El Process operates on the principles of capacitive ionization to remove ionic compounds referred to as total dissolved solids. The main component of the Des El System is a novel, electrostatic changing system that behaves as a capacitor and is comprised of expensive carbon electrodes. The capacitor is energized using direct current, creating positive and negatively changed surfaces. Ionic compounds such as iron, chloride, arsenic and nitrate are attracted to and electrostatically adsorbed onto the surface of the electrodes (3).



Re-arrangement of Surface Topography After Mining

In order to rearrangement of the area after surface mining, it can be done in two stages. The first stage is to rearrange the area and in the second stage the area must be replanted. The aim of re arrangement of the mined area must be compatible with the original view. When the area is planted, the use of the area must be in accordance with the environment. After mining operation, the use of the area depends on the properties of the soil. Rearranged area after plantation can be used in agriculture (garden and pasture) or on recreation (parks and amusement etc.).

Two examples will be given on rearrangement of mined out surface area of lignite mines. Kostak (4) discusses re-plantation and rearrangement of lignite mines in Aydın for agricultural purposes. Aydın Lignite A.Ş. Company operates lignite open cast mining in Aydın area since 1990 with an annual production capacity of 450 thousand tons. The Company started a project in cooperation with Aegean Forestry and Research Institute and planted five different kinds of trees bike, pinus brutia, Robinia, pseudoacacia, Elagnus angustifolia and Amigodalas angustifoli and Olea europa in different areas. Productivity of those with weathering and maturing has been closely watched for five years and results will be presented in a report soon. In 2003, Agricultural Company (Aydın Linyit A.Ş.) was started with two aims of mined out areas into productive fields to carry out ecological agriculture in European Standards.

Replantation of Ağaçlı open cast mining area (İstanbul) was described by Kantarcı (5). Ağaçlı coal mining is located at the Black Sea coastal lands of Çatalca Peninsula caused to degradation of natural structure of forest ecosystems. A pioneer reclamation, rehabilitation and forestration programme was started on the residual materials in 1988. The pioneer study achieved successful results. Due to the plantation of fast growing species (Pinus pinaster, Pinus pinea and Robinia pseudoacacia), the land was covered with trees. Soil erosion based on the rain and winds was prevented due to strong northwinds and heavy rains. Thus, planting on the mining residuals was converted to a dynamic forest ecosystem in a short time for 8-10 years.

In-situ Mining

In-situ mining or solution miming: leaching; is the chemical extraction of metals or minerals from the confines of an ore deposit as well as from materials already excavated and mined (6).

Current solution mining or chemical mining involves the application of leaching to mineral containing rocks that is low-grade (below cut-off grade) to meet the cost of conventional mining and concentration. Presently solution mining is referred to the extraction of evaporates, namely trona and halides. On the other hand, chemical mining includes copper, gold, silver and uranium where chemical change takes place after leaching. In the future, the techniques will be developed in –situ extraction and recovery of metals such as zinc, nickel, manganese, molybdenum and aluminum. Chemical mining (solution mining) is environmentally attractive, since it creates less surface disturbance and results in less water and air-pollution than the others. Chemically mining can be divided into heap leaching, dump leaching, vat leaching and in-situ leaching (7).



In order to achieve environmentally attractive future mining operation, it should be with zero waste and negligible foot-prints, regarding subsidence, tailings, waste and fill. In situ mining may be ideal in this picture (8).

CONCLUSIONS

- 1. The effect of mineral exploration on the environment appears to be negligible.
- 2. The effect of surface mining (open cast mining) can be remedied, however, through reclamation, rehabilitation and reforestation.
- 3. Subsidence by underground mining can be minimized by the application of yielding supports, but cannot be prevented altogether.
- 4. In mineral processing, recycle and process waters can be treated by special reagents in Russia. Biological denitrification and electronic deionization methods are utilized in South Africa.
- 5. Through in-situ mining, the mine of future will be with zero waste and negligible footprints.

REFERENCES:

- 1. Peng, S.H., and Chiang, H.S., Longwall mining, Wiley (Interscience), New York, 1984, 708 pp.
- 2. Abramov, A.A., Russia Perspective on Indicator of Sustainability for Flotation Processing of Minerals., A review on Indicators of Sustainability for the Mineral Extraction Industries, Editors: R.C. Villas Boas et al., CYTED, 2006, pp.209-226.
- 3. Shelp, G., Unpublished Internal Document "BRGM installed the worlds First Deionization Pilot Unit that will treat 10000 liter water per day".
- 4. Kostak, S., Aydın Linyit A.Ş. Arazilerinde Yeniden Bitkilendirme ve Çevre Sempozyumu, 5-6 Mayıs 2005 Ankara, pp.183-188 (Turkish Text)
- 5. Kantarcı, M.D., Ağaçlı (Istanbul) Açık Maden Ocağı Artıklarının Islahı ve Ağaçlandırılması Çalışmalarında Elde Edilen Sonuçlar, Madencilik ve Çevre Sempozyumu, 5-6 Mayıs 2005, Ankara, pp. 173-182(Turkish Text).
- 6. Schlitt, W.O., Interfacing Technologies in Solution Mining, Society of Mining Engineers- AIME, New York; 1982, 372 pp.
- 7. Doğan, M.Z., Chemical Mining Lecture Notes, ITU Mining Faculty, Mineral Processing Section, September 1985, Istanbul.
- 8. Batherham, R.J., and Floming, R., Sustainability and Mineral Processing: The text chapter, Proceedings of XXIII International Mineral Processing Congress, 3-10 Sept. 2006, Vol.3 pp. 2078-2083, İstanbul Turkey.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



ORIENTATION OF THE TOURISM SECTOR TOWARD AN EMPHASIS ON ENVIRONMENTALISM AND ECO-FRIENDLY ISSUES

¹Frank BATES,²Türkay YILDIZ, ³Işık Özge YUMURTACI

¹İzmir University of Economics, Department of Logistics Management, İzmir /Turkey, ²İzmir University of Economics, Department of Logistics Management ³İzmir University of Economics, Department of Logistics Management frank.bates@ieu.edu.tr

With globalization pressures acting upon planners trying to define business development interests in terms of environmentalism and eco-friendly issues, there are questions about the possibility for the tourism and hospitality sectors to serve as a vehicle by which to emphasize the relative attractive role of ecotourism and the agri-environment. This research work seeks to study certain factors within conservation measures by the EU in consideration of similar efforts by Turkey – a new candidate for entry into the membership.

Factors identified include EU standards and practices regarding incentives, conversion cropland allocations, farming systems, agricultural efficiency, market supply and demand factors, reversal of decline in biodiversity, soil and irrigation, pollutant run-off, landscape management, food safety and quality, employment, energy constraints, crop yields, farm size, pest, weed and disease controls, animal health / welfare and others. There exists the need to develop the initiatives anticipating the worthwhile nature and the likelihood for the success of efforts to create value-added processes and services associated with organically-farmed crops.

This study may have arrived at a fortuitous time when global interests and attention are being placed upon organically grown and cultivated products for a growing sector of health conscious and ecologically, environmentally concerned consumers. Thus, a basic purpose of this analysis is to use the qualitative element within the TQM process – benchmarking – as a tool for thinking about that part of the business development process for the tourism sector requiring strategic planning to evaluate and compare processes to deal with and to improve while adding value to the global efforts facing environmental challenges for the 21^{st} century.

Keywords: Business & Environment, Environmental Awareness

1. INTRODUCTION

Organic farm agriculture is a crop production system that promotes environmentally, ecologically, socially and economically sound cultivation of food and fibers, and excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, livestock feed and additives and genetically modified organisms. Utilizing both traditional and scientific knowledge, organic agricultural systems rely on practices that promote and enhance biodiversity, biological cycles and soil biological activity. It is based on minimal involvement of off-farm inputs and on management practices that restore, maintain or enhance ecological harmony.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

The purpose of organic farm agriculture is to optimize the health and productivity of interdependent communities of soil life, plants, animals and people. Organic farm agriculture is based on generally accepted principles which are the bases for social, economic, geoclimatic and cultural contexts (www.ifoam.org). It is because of this attention being placed on organic farming (OF) that there has been continuing growth in the interest of showcasing it as a business development goal within the tourism and hospitality sectors; this initiative has become know as agro-tourism or eco-tourism.

Agro-tourism or eco-tourism, as defined by the BBC Travel Guide, is a kind of tourism that assists in creating employment and in protecting nature (Soyguder, 2004). Many countries have begun to actively promote investments and to participate in agro-tourism, an ecosystem service that creates opportunities for development of rural populations and the diminishment of further urban migration. The agricultural activity of organic farming fits in well as an ingredient of such programs. Organic farm agriculture is a crop production system that promotes environmentally, ecologically, socially and economically sound cultivation of food and fibers, and excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, livestock feed and additives and genetically modified organisms. Utilizing both traditional and scientific knowledge, organic agricultural systems rely on practices that promote and enhance biodiversity, biological cycles and soil biological activity. It is based on minimal involvement of off-farm inputs and on management practices that restore, maintain or enhance ecological harmony. The purpose of organic farm agriculture is to optimize the health and productivity of interdependent communities of soil life, plants, animals and people. Organic farm agriculture is based on generally accepted principles which are the bases for social, economic, geo-climatic and cultural contexts (www.ifoam.org). In addition, World-Wide Opportunities on Organic Farms (WWOOF) organization is a dedicated entity which deals with those people who want to volunteer on organic farms. There are some dozen of countries with a national WWOOF organization. Turkey is also a part of this organization. (Source: www.wwoof.org)



Figure 1. A map of Turkey – Gray circles/dots are showing organic farming activities, represented within the WWOOF organization. (Source: www.tatuta.org)

Figure 1 shows organic farming stays in map of Turkey. Gray circles/dots denotes the location of the farms form organic farming stays.



Organic agriculture in Turkey began in 1984-1985 to meet the demands of a few European countries. During this period traditional exported products were primarily dried figs and raisins. Beginning in the '90s, exports were few in number with exporters working with agencies representing foreign firms. The Aegean region has an important place in OF agriculture in Turkey. The first organic farming activities began in the Aegean Area, started by the Rapunzel Company of Germany. With the likelihood of progress being made by Turkey to enter the European Union (EU) in the coming period, there is increasing speculation about what the agricultural contribution will be from this addition to the European membership (http://www.turkishdailynews.com/FrTDN/latest/dom.htm#d3). Simultaneously with today's global challenges influencing all aspects of the supply chain network, business planners have been working to understand the tie-in between their own organization's goals and objectives with that of Total Quality Management (TQM) and its concepts. This interest has not escaped the attention of the agricultural sector. The process of 'benchmarking' has received some degree of recognition in these efforts due to the rational process inherent in the use of this TQM tool.

A benchmarking of the processes within the organic agricultural farm sector permits a search for inefficiencies and problem solving, while contributing to decision-making support systems; the results can assist in identifying areas negatively impacting quality, costs and schedules objectives and in illustrating relationships between the supply chain's members for improvements. Ultimately, the objective of benchmarking is to prove that improvements in current processes and activities have been achieved. The resulting changes can benefit agricultural operations by increasing efficiencies, improving the quality and creating added value while increasing the flow of materials. Achieving these improvements in organic agricultural farming is the process for TQM, made possible by adaptation to such evaluation and improvement processes [Marchwinski, 2003]. As a result, the researchers seek to explore and evaluate the applicability of a 'fit' of generally accepted criteria dealing with problem solving and resolution into this analysis of the 'benchmarking' of Turkey's standing and activities within organic farming, in consideration of its growing recognition, acceptance, adaptation and deployment of OF activities generally for the global marketplace, and specifically as a tool to be used by the tourism and hospitality sectors.

2.USING THE TQM PROCESS OF "BENCHMARKING" FOR ORGANIC FARMING

The researchers engaged in the collection of empirical data pertaining to that of a company engaged in organic agricultural processes in Turkey – Germany's Rapunzel Company in Izmir. This approach is taken to explain the development of the OF phenomena within Turkey to that interest taken by the membership of the EU. The Rapunzel company deals in local and imported organic based products. Examination and analysis of the data illustrates how benchmarking processes can be incorporated into problem solving activities and how they can be used as a means to apply toward the evaluation of Turkey's fit and activities in this sector. Specifically, the following example focuses on the sector's use of benchmarking for evaluating and documenting the status of problems and barriers to Turkey's organic farming activities.



Benchmarking refers to a process wherein an entity (organization, company or country) seeks to compare its own processes and products to those of the best in the world; afterwards it must then try to achieve the same level or consider not continuing. With these changes, the entity must seek to engage its workforce to continuously improve to maintain a leadership position (Waterfield). With this understanding of the nature of benchmarking, the methodology deployed by the researchers involves the analyses of data (criteria and factors) taken from the website: www.ifoam.org, (Information Federation of Organic Agriculture Movements - IFOAM), wherein some 24 factors and criteria – each with various sub-groupings – are listed each bringing with it definition of problems, solutions, and a grade evaluation as to the relevance to an EU database. The researchers assigned values to these same classifications in terms of the degree of relevance, i.e., "3" for 'high relevance, "2" for certain/moderate relevance, and "1" for conditional relevance depending on circumstances. In an effort to manage the analytical comparisons, the 24 factors / criteria were consolidated down to four (4) major groupings/Rows being impacted by the organic farm agricultural sector as follows:

- Cultural/Social Health Well-being
- Environment
- Farm Producers' Operational Efficiencies
- Market Demands and Economic Forces

Each of these major groupings were then assigned a weighted composite value by which to compare similarly grouped and consolidated benchmarking criteria for analyzing Turkey's unique problem areas with attendant solutions within the organic farming sector. The researchers determined weighted composite values in each grouping – the values coming from an assignment of the values of 1, 2, or 3 to coincide with the X?, (X), AND X relevancy designations, respectively, in the IFOAM website provided table.

In this analysis, specific areas are codified as problems to be solved. This is followed by the solutions and remedial/positive measures to be taken. Factors denoting relevance to the norm (as presented in the IFOAM guidelines) are compared to factor relevancy arrived at by the researchers through interviews with the German Rapunzel Company in İzmir, with interviews with other industry trade experts and analyses of industry sector data and the trade media. The benchmarking study (shown in Table 1) posits those factors that form the benchmarking process of TQM in this report.

For example, to avoid having to deal with the IFOAM grouping of 24 factors, further broken down in another 75 sub-groupings within the IFOAM guidelines, the factors considered within the benchmarking process of TQM are consolidated into four major categories to assist in clarity and brevity, each with sub-groupings totaling 34:

- <u>"Cultural/Social Health Well-Being"</u> (pesticides-3, antibiotics-3, pollution-3, genetically modified organisms (GMO)-3, degree of awareness of bio-diversity-3, urban migration-2, re-vitalization values-1, food supply and social health-3)
- "Environment and Ecology" (pesticides-3, agrochemicals-3, pollution-3, degree of bio-diversity-3, deforestation-1, forestry replenishment-3, soil degradation-3 and erosion-3)



- "Farm Producers' Operational Efficiencies" (soil condition-3, biological controls-3, green revolution-3, low profits-1, value added activities-3, market-oriented production-3, low cost production labor and resources-3, use of natural resources-3, recycling-3, crop nutrients and production cycles-3, small farmer survivors-1)
- "Market Demands and Economic Forces" (foreign exchange-1, currency markets-1, import / export valuations-1, environmental certifications-3, market information-3, creation of value for achieving competitive advantage-3)

| Problems to be solved - Metric | Solutions / Positive measures | Relevance of agriculture | organic |
|-----------------------------------|--------------------------------------|--------------------------|------------|
| | | 3= high relevance | |
| | | 2= certain | |
| | | relevance | |
| | | 1= relevance dep | pending on |
| | | conditions | |
| | | EU | TURKEY |
| Cultural/Social | No use of chemical pesticides | 3 | 2.1 |
| Health Well- | No use of antibiotics | 3 | 2 |
| Being | No pollution | 3 | 2.2 |
| | No Genetically modified organisms | | |
| | (GMO) | 3 | 1.5 |
| | Degree of awareness of bio-diversity | 3 | 1.5 |
| | Urban migration | 2 | 2.5 |
| | Re-vitalization values | 1 | 2 |
| | Food supply concerns | 3 | 1.5 |
| | Social health concerns | 3 | 2 |
| | Average weighted values | 2.63 | 1.92 |
| Environment | No use of pesticides | 3 | 2 |
| and Ecology | No use of agrochemicals | 3 | 2 |
| | Pollution | 3 | 2.5 |
| | Degree of biodiversity | 3 | 1.5 |
| | Deforestation | 1 | 1.5 |
| | Support for forestry replenishment | 3 | 1.8 |
| | Soil degradation awareness | 3 | 3 |
| | Erosion of soils | 3 | 2.6 |
| | Average weighted values | 2.75 | 2.11 |

Table 1. Factors Considered Within the Benchmarking Process of TQM



Table 1. Cont.

| Farm Producers' Operational Efficiencies | Soil condition | 3 | 3 |
|---|---|------|------|
| | Biological controls | 3 | 2.5 |
| | Green revolution | 3 | 2 |
| | Low profits | 1 | 2.5 |
| | Value added activities | 3 | 2 |
| | Market-oriented production | 3 | 2.2 |
| | Low cost production labor and | | |
| | resources | 3 | 3 |
| | Use of natural resources | 3 | 2.5 |
| | Recycling | 3 | 1.5 |
| | Crop nutrients and production cycles | 3 | 3 |
| | Small farmer survivors | 1 | 3 |
| | Average weighted values | 2.64 | 2.47 |
| Market Demands and Economic Forces | Foreign exchange | 1 | 3 |
| | Currency markets | 1 | 3 |
| | Import / export valuations | 1 | 3 |
| | Environment certifications | 3 | 3 |
| | Market information | 3 | 2.4 |
| | Creation of value for achieving competitive advantage | 3 | 1.5 |
| | Average weighted values | 2.00 | 2.65 |

(Source data taken from Gunnar Tundgren, IFOAM President/Sweden, www.ifoam.ort)

3. EVALUATION OF BENCHMARKS ESTABLISHED AND FINDINGS REACHED

In looking at the comparative values in an effort to address and explain deviations and differences to the 'norm' of the EU relevancy factors/criteria, we can arrive at certain observations: Within the first segment of "Cultural/Social Health Well-Being," it is reasonable to expect differences of the relevancy of the factor criterion between the EU and that of Turkey. One explanation is the perceptions and the levels of consciousness between the population entities. Comparing the first grouping, i.e., that of 'cultural health and well-being,' the differences are clearly indicated and point to the greater awareness and appreciation for the non-use of chemicals by the EU versus that by Turkey, the latter assigning only 'average importance'. With the lower scoring by Turkey in concern for a better environment and healthful well-being – as compared to the EU at large – there may be an indication that there is not yet a grand appreciation by its citizenry in this area. This may give an indication that the current level of interest in the development, growth and general acceptability of OF in Turkey may hinder greater achievements in the reversal of urban migration, given that one third of the population work in the agricultural sector.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

However there is evidence that there may be a growing appreciation for healthier food and environment, as reflected in the comparative values. Within the second segment of "Environment and Ecology," the focus is on the well-being of the general public (municipalities, organizations for the public good and such) rather only that of individual (family unit and such) as indicated within the first segment. Once again the average weighted value falls below that of the EU with similar observations and findings. Within the third segment of "Farm Producers' Operational Efficiencies," the observations may appear to be In consideration of healthy profit growth and low cost of factors of more promising. production, Turkey seems to be on a course to achieve world class status as indicated by the comparison between the EU and Turkey. Further substantiating the findings in the above illustrated benchmarking table are the interviews with industry and academic experts in the field. In this segment, Turkey seems closely in synchronization with that of the EU. The data suggests that the Turkey's small farmer (SME's) may gain more than that of the European Union. Finally within the fourth segment, "Market Demands and Economic Forces," not surprisingly, there is the anticipated evidence of the anomaly of different economic fortunes that have developed over the years for the two entities. This shows the clear differences in attention being played on the relevancy of the attendant factors – the EU with a readily exchangeable and internationally traded foreign currency, infrastructures already in place for certifications of marketable goods and services, and the intense attention being placed upon the creation of value between and amongst the elements of supply chains. As can be seen, with the development of interests in OF, the tourism and hospitality sectors have deployed this tool in an effort to assist in achieving their business development goals and objectives.

4.SUMMARY AND CONCLUSIONS

As the result of the benchmarking analysis of the previous section, it appears that there is an overall favorable rating for Turkey; the ratings pertaining to their awareness gives indication of the favorable pre-disposition by Turkey toward a 'bias for action' to identify problems, seek positive solutions and to prioritize their activities in concert with that of the IFOAM guidelines. Examples drawn from the trade and industry press and from the interviews conducted and from the study of empirical data from the multi-national corporation in Turkey have been studied. And with the development of the interests in OF, there is reason to believe that the tourism and hospitality sectors may find that OF, as a part of their tourism programs, will serve them well. It is suggested that OF industry strategists and tourism and hospitality sector planning professionals can utilize benchmarking processes within the organization, as part of their evaluation and attempts for changes made to prove that improvements have been achieved, so as to illustrate that efforts to improve their farm's product or service offerings have added to the firm's competitive advantage. With continued pressure to implement changes for improved operations, the strategically oriented planning managers must seek out and embrace new tools and processes that will help in achieving their goals and objectives. While the various approaches such TQM processes activities, such as benchmarking, do not represent the ultimate solution to the problems of OF planners, they may instill significant potential for creative problem solving in many situations. Agricultural and tourism and hospitality planning managers who have not examined this approach may be overlooking an opportunity to add to their firm's level of competitive advantage.



REFERENCES:

Aksoy, U., Tuzel, Y., and Altindisli, A. (2001). *Development of organic agriculture in Turkey:* a case study for Mediterranean countries. Proceeding of International symposium on organic farming: Organic agriculture in the Mediterranean basin, Agadir - Maroc, 7-10 October 2001, p.217-225.

Butler, G., Newton, H., Bourlakis, M. and Leifert, C (2004). "Factors Influencing Supply and Demand For Organic Foods". Food Supply Chain Management, edited by Michael Bourlakis and Paul Weightman, Blackwell Publishing, UK.

Ertem, Atilla (2004). Personal interviews with Rapunzel company representative of Rapunzel Company, İzmir, Turkey, January 2004.

Marchwinski, Chet (2003). "Get Lean, Cut the Fat in Your Shop with Lean Manufacturing", Cast Polymer Connection, May/June, pp20-39.

Organic Farming and the European Union (1999). UKROFS Standards for Organic Food Production: January.

Soyguder, Eser (2004). "Agro Tourism, Miracle from Villager Women"," Turkish Business Opportunities, Year 4, Issue 15, July-September Quarterly, pp. 43-48.

Türkekul, B. (2001). Turkey 2001: development and agro-food policies. Country report. CIHEAM. Paris.

Waterfield, William (2003). "Benchmarking as a Means of Improving the Financial Wellbeing of Organic Dairy Farms." Farm Consultancy Group, UK.

Zanoli, R.affaele, Antonelli, Annarita. and Öztürk, Emel (2002). "Successful marketing management and rural development in the Mediterranean: a case study from the Turkish organic sector." Based on master thesis at Mediterranean Organic Agriculture of Bari, entitled "Socio-economic impact of organic farming in rural in Turkey: the case for Rapunzel Turkey project."

Websites:www.bbctravelguide.org

www.wwoof.org

www.tatuta.org

http://www.hobotraveler.com/ecotourism.php

http://www.hobotraveler.com/ag2turkeyagrotourism.php

http://www.goturkey.kultur.gov.tr/files/tourismturkey.ppt

www.ifoam.org [Information Federation of Organic Agriculture Movements – IFOAM]

http://www.rapunzel.com.tr/iletisiming.htm

http://www.turkishdailynews.com/FrTDN/latest/dom.htm#d3 President Sezer approves law on organic farming - A New Approach In Agriculture, Ankara - Turkish Daily News, Dec 4, 2004 http://strategis.ic.gc.ca/epic/internet/inimr-ri.nsf/en/gr111760e.html

U.S.Commercial Service, Intl Trade Administration, U.S.Department of Commerce

http://www.undp.org/biodiversity/biodiversitycd/practiceTurkey.htm

http://www.undp.org/sgp/cty/EUROPE/TURKEY/ov.htm United Nations Development Programme, Small Grant Programme. Women of Karaburun AgroTourism Cooperative Project

http://www.undp.org/sgp/cty/EUROPE/TURKEY/pfs.htm

http://www4.geog.okstate.edu/eco_me/Webpages/eco_main.htm



TURKEY'S ENVIRONMENTAL POLICIES FOR AGRICULTURAL POLLUTION

H.Ece SALALI*,Ela ATIŞ**,Nurdan Erdoğan***

* Ege University, Agricultural Research Center, Izmir, Turkey **Ege University, Faculty of Agriculture, Dept.of Agricultural Economics, Izmir, Turkey ***Ege University, Centre For Environmental Studies, Izmir, Turkey ela.atis@ege.edu.tr

Environmental pollution, consisting of consequences of population increase, urbanization and technology and increasing by consumption of natural resources, forms one of the most important threats for human. Because of the environmental pollution, all livings, especially humans, are affected significantly, having shortened life span and also dying. At this point, the role of agricultural activities reaches very important dimensions.

Even though the monoculture production method and intensive factor usage of agricultural areas, sound like increase the potential output in fact it distresses the sustainable soil productivity and natural stability. Overwhelming of the soil, results in negativities such as soil erosion, soil degradation, and aggregation of destructive chemicals and blending of underground waters and pollution of atmosphere. While the conventional agricultural systems give harm to the environment; at the same time the application of chemicals and fertilizers in modern agriculture with growing and developing regulators, cause insanitary leftovers in the foods. So, deterioration of human health and the mechanism which affects the human health, is seen.

The study's methodology will be done by consulting the relevant literature. The relevant publishing, public documentaries and scientific researches will be evaluated. Aim of this study is to analyze the environmental pollution-oriented policies and the applicability of these policies in Turkey. With this study, the very latest improvements in Turkey will be specialized.

Keywords: Environmental Policy, Agricultural Pollution, Environmental Pollution

INTRODUCTION

In recent years, as the world's population continues to grow, solving the nourishment problem is getting harder. To achieve this problem, new technologies are developed and changes over production are occurred.

A rapidly growing global human population and changing consumption patterns have stimulated the evolution of agriculture from traditional to modern, intensive systems. Nearly one third of the world's land area is used for food production, making agriculture the largest single cause of habitat conversion on a global basis. Producing more products with less resource, changing life patterns showing upward tendency of consumption impacts the environment significantly.



It is known the agriculture affects the environment in a different ways. Excessive or inappropriate use of fertilizers, livestock manure and agro-chemicals can pollute and contaminate surface and groundwater. Farming can reduce the habitat available to wildlife. It can lead to soil erosion, particularly when it brings environmentally sensitive land under cultivation [9].

Threats from pollution, unsustainable use of the lands and seas, threats to biodiversity, consumption of renewable and non-renewable resources need to be amended. Another problem connected with these, is growing world population. Overpopulation refers to a condition in which the population size exceeds the environment's carrying capacity. With industrialization, on the hand and urbanization on the other, the increasingly lessening amount of agricultural lands entails plenty of problems concerning the world population of the future. In order to feed the rapidly growing population, the fertility of agricultural lands is increased by use of chemicals, fertilizers and pesticides.

The recent intensification of agriculture and the prospects of future intensification will have major detrimental impacts on the nonagricultural terrestrial and aquatic ecosystems of the world. The doubling of agricultural food production during the past 35 years was associated with the increase in nitrogen fertilization, increase in phosphorus fertilization, increase in the amount of irrigated cropland and increase in land in cultivation. These projected changes would have dramatic impacts on the diversity, composition and the functioning of the remaining natural ecosystems of the world, and on their ability to provide society with a variety of essential ecosystem services [18].

After 1950's it is appeared that, the rapid economic growth is geared to especially the rapid consumption of the non-renewable resources, devastation of sources in non-recyclable manner and welfare of the human and environment quality. The environmental policies which are agricultural pollution control-oriented and sustainable agricultural development approaches have discussed in 1980's and 1990's and have been discussing extant [20].

Also, in Turkey like other some countries, it is aimed with agricultural policy to increase the agricultural production. But, this aim sometimes causes farm practices that damage the environment. There are the problems of environmental damage arising from modern agricultural production methods. Carrying out agricultural policy is also not sufficiency to solve environmental problems originating from agriculture. Then, it can be suggest an alternative approach towards agri-environment policy for Turkey

In this study, it is aimed to allow the agriculture to take a proactive stance, to clarify sectoral impacts and to propose appropriate political measures. The ambition of this study is to provide the guidance on the political instruments and measures to be used in the integration of agriculture sector in the environment.

The purpose of part II is to introduce general concepts of the environmental problems related to agriculture. The purpose of part III and part IV is to display the characteristics of Turkey's agriculture sector and analyze the agricultural problems peculiar to Turkey.



The main material in this study formed by the publication and studies made by public institutions, professional organizations, reports by non-governmental organizations, trade association and previous studies done by universities and researchers and international organizations.

ENVIRONMENTAL PROBLEMS ORIGINATING AGRICULTURE

Relation between agriculture and environment is affected by socio-economic and cultural conditions. While the industrialized societies or the societies which are sufficient for the environmental protection conscious level are showing highly interest to environment protection at the time of industrial agricultural activities, there is a tendency of changing or developing traditional agricultural methods in developing countries. In the present case, the emergence impacts are generally causes significant ecological and environmental problems, reduces water and soil quality, causes salinity or more significant problems such as the loss of physical place. When the facts are considered, the instruments that provide to integrate the entire environment management between agriculture and environment, food management and other agricultural activities should be developed [16].

For example, while the developed agriculture in a region, affecting the habitat, the production of oxygen and climate positively; especially in the regions where the industrial agriculture is intensive, it attracts attention to some negative impacts that agriculture gives to environment such as inorganic nitrate pollution, pesticide pollution and salinity problems.

General agricultural activities such as; burning fossil fuels, removing or restoring native habitat, use of pesticides, use of water, use of antibiotics, releases from manure pile, over fertilization, use of toxic chemicals and hormones, physically changes the soil structure. The activities those mentioned above also impact the biodiversity, water sources, and air and cause climate change.

Biodiversity

Biodiversity encompasses all life on Earth. Biodiversity refers to the great variety of species and ecosystems and the ecological processes of which they are a part. It includes all living organisms, both wild and domesticated. Biodiversity, including genetic resources, and species and ecosystem diversity, is of great importance to agriculture. As a natural resource based industry, agriculture depends on a healthy diversity of organisms and ecosystems that are its foundation. Agricultural practices such as tillage, wetland drainage, grazing and use of fertilizers and pesticides can affect biodiversity, although when applied properly, the impact on wild flora and fauna is minimized.

Water sources

Agricultural inputs such as fertilizer, livestock manure and pesticides may cause water contamination when improperly disposed of, stored or applied. High concentrations of organic matter, phosphorus and nitrogen in surface water can lead to its eutrophication and deoxygenation, which in turn destroy aquatic habitat and produce taste, odour and aesthetic



problems. Intensive agriculture in areas of high soil permeability and high water tables may cause groundwater contamination from the percolation of chemicals and nutrients through the soil profile. There is also concern for negative health effects in areas where certain bacterial or nitrate concentrations exceed drinking water guidelines in surface or groundwater [1].

Air

The crops, livestock, and soils that make up the farms are immersed air. They give out gases and particles that change the air's composition, both locally and far field.

Climate change

Agriculture increases greenhouse gases by converting soil carbon into CO2 and by high releases of methane and nitrous oxide from ruminants and from anaerobic treatment of manure and by burning fossil fuel.

Also, livestock impacts on the environment. A new report from FAO (Food and Agriculture Organization) says livestock production contributes to the world's most pressing environmental problems, including global warming, land degradation, air and water pollution, and loss of biodiversity. Grazing occupies % 26 of the Earth's terrestrial surface, while feed crop production requires about a third of all arable land. Expansion of grazing land for livestock is a key factor in deforestation, especially in Latin America: some % 70 of previously forested land in the Amazon is used as pasture, and feed crops cover a large part of the reminder. About % 70 of all grazing land in dry areas is considered degraded, mostly because of overgrazing, compaction and erosion attributable to livestock activity [7].

At the same time, the livestock sector has assumed an often unrecognized role in global warming. FAO estimated that livestock are responsible for % 18 of greenhouse gas emissions, a bigger share than that of transport. It accounts for % 9 of anthropogenic carbon dioxide emissions, most of it due to expansion of pastures and arable land for feed crops. It generates even bigger shares of emissions of other gases with greater potential to warm the atmosphere: as much as % 37 of anthropogenic methane, mostly from enteric fermentation by ruminants, and % 65 of anthropogenic nitrous oxide, mostly from manure.

Livestock production also impacts heavily the world's water supply, accounting for more than 8 percent of global human water use, mainly for the irrigation of feed crops. Evidence suggests it is the largest sectoral source of water pollutants, principally animal wastes, antibiotics, hormones, chemicals from tanneries, fertilizers and pesticides used for feed crops, and sediments from eroded pastures [7].

ENVIRONMENTAL IMPACTS OF AGRICULTURE AND POLLUTION IN TURKEY

Total area of Turkey is 78 million hectare and agricultural land excluding pastures and meadows is 27 million hectare. Total population is 71 million for 2004 census. Sectoral distribution of Gross Domestic Product (GDP) for agriculture sector is %11, for industry sector it's %20 and services sector is %69 for 2004 [13]. In terms of years while the sectoral distribution of agriculture in GDP was % 43 in 1923, in 1980 it has been on the decrease with % 24. There is a downside potential for agriculture in sectoral distribution of GDP in 2004.


Sectoral distribution of employment, for agriculture and forestry is %33, for industry it is %18, for construction is %5 and for services is %44 in 2004. In 1990 sectoral distribution of employment for agriculture was % 48. According to this, we can see the downside potential in sectoral distribution of employment for agriculture in 2004. These basic indicators given above, shows us agriculture is being significance in Turkey's economy.

Table 1. Indicators of Impacts of Environment Related to Agriculture

| Indicators | Turkey |
|---|--------|
| | |
| Use of pesticides (kg/ha) | 0,6 |
| Use of nitrogen fertilizer (kg/ha) | 56,0 |
| Organic farms as % of total farmland | 0,8 |
| Use of water in agriculture (%) | 73,8 |
| Greenhouse gas emissions related to agricultural activities (%) | 6,1 |

Source: [2] and [19]

There are a number of reasons for giving agriculture particular attention in environment;

-Agriculture has major positive, but also potentially negative, effects on the environment. Sustainable agricultural policies are therefore needed to minimize the negative impacts of agriculture.

-Agriculture is usually concerned with the production of food, and thus has strategic and political significance for food and livelihood.

-Agriculture may also provide raw materials to industry and may therefore have considerable economic significance.

-Environmental degradation and resource conservation are of increasing concern to the Turkish agricultural sector. Intensifying production, especially by using chemical fertilizers, pesticides and irrigation, puts further emphasis on the environment.

Impacts On Water Resources

Water consumption

The total water volume in the world amounts to 1.4 billion km³, 97.5% of which is saline water in the oceans and seas, 2.5% of which is fresh water in the rivers and lakes. Due to fact that 90% of fresh water exists in the South Pole and North Pole, human beings have very limited readily exploitable fresh water resources [5]. Turkey's total water resources that can be economically and technically exploited are around 1,600 cubic meters per capita per year. Most of it (%86) is from internal rivers, %11 from groundwater resources and %3 from external rivers flowing into Turkey. The distribution of water resources is uneven over the year and between regions, with the Western regions (Marmara, Aegean and Central Anatolia) being relatively poor in water. Furthermore, the complicated topography makes it difficult to control water resources in Turkey. Agriculture is most significant user of water resources in Turkey. Approximately, three quarters of the total freshwater (73.8 %) extracted is used for agriculture (Table 1).



Large-scale dam construction has allowed irrigated areas to expand by two thirds over the last 20 years. Four and a half million hectares are currently irrigated, which constitutes %16 of the total agricultural land. As regards groundwater, many aquifers are being exploited beyond their sustainable yield, particularly in the Mediterranean region [15]. Especially at the west and south regions of Turkey, degradation of features of the ground, salinization, increase of pests and disease rates and reduce of the yield are being matters of concern as a result of excessive irrigation. Çukurova, Gediz, Söke ve Amik plains are forming typical example of this situation. Another example is from Lake Sapanca. Sapanca Lake is located on a tectonic hole, which is situated between Izmit Bay and Adapazarı Meadow and runs parallel to Iznik Lake._Nowadays there are no more significant forest areas surrounding Lake Sapanca. Flow volumes of the streams, which feed the Lake are very low and many of them have dried up. Lake Sapanca is one of the few lakes in Turkey, which provides drinking water, but it is exposed to significant problems such as pollution coming from streams, agricultural pollution because of pesticides, fertilizers, erosion problems caused by decline of forests and waste waters from industrial facilities around the lake [8].

Use of fertilizers and pesticides

As a matter of water resources, one of the important environmental problems is surface and ground water pollution. The key factors of water pollution in Turkey are urbanization, industrialization and some agricultural implementations. In fact, industry's negative impact on environment is more than the other factors, also agriculture plays role in pollution. Particularly, intensive agriculture becomes prevalent, used chemical fertilizers and pesticide ruins, being mixed with surface and ground waters and causes pollution.

Fertilizers and pesticides are the most important source of diffuse pollution. Total usage of these agricultural inputs is low in Turkey and seems to be decreasing in total. Pesticide use is 0.6 kg/ha, nitrogenous fertilizers use is 56 kg/ha (Table 1). But, especially in the Mediterranean and Aegean Region of Turkey, pesticide and fertilizer use is higher than Turkey's average usage. An increasing trend in the consumption of pesticides is observed in 1990-1997. Although, according to the European Environmental Agency, fertilizer use also remains relatively low in Turkey, at levels similar to central and eastern European countries. In the mid-1990's, nitrogen and phosphate use per hectare of arable land and permanent cropland was among the lowest among OECD countries [12]. Average fertilizer use decreased from 91 kg. of nutrients per ha in 2000 to 87 kg of nutrients per ha in 2001. This could be explained by the removal of chemical fertilizer subsidies.

Pollution is not exclusive to those areas with high input use. In some zones, run-off, drainage and deep percolated water from irrigated lands contain high levels of fertilizer and pesticide residues. In Turkey, every year 500 million tones of fertile soil and nearly 9 million tones of vegetal nutrients lose as a consequent of erosion [4]. Erosion is the key factor of pollution of ecosystem and waters, with this characteristic. Because, vegetal nutrients, fertilizers and pesticides that move by surface flows, cause pollution of rivers, lakes and seas.



Impacts On The Soil

Like other Southern European countries, Turkey is naturally prone to erosion due to its climatic and topographic conditions. The degree of erosion has gradually increased since the 1950's as a result of human activities. In Turkey, the erosion is more than 12 times from Europe and 17 times from Africa. Distribution of soil erosion categories according to the degree of erosion are % 14 slight, % 20 moderate and % 63 severe and very severe. Only % 3 of rocky area is not exposed to erosion. Erosion decreases the efficiency of soil, causes the nutrients to disappear, pollutes the water and causes the loss of efficiency and quality [10].

Besides erosion, another problem related to land sources affected by agricultural implements is soil pollution. Pesticides that used in agricultural production reach to the soil indirectly by the effects such as rain and wind. Pesticides that used for insects, nematodes and seed, mix with soil directly. In this way, pesticides compose in the soil and being residential. Also, fertilizers that used over capacity and wrongly in agricultural lands affect the land sources and effect the land reaction, structure and livings in the soil.

Impacts On Climate Change

In Turkey, the shares of direct greenhouse gases (CO2, CH4 and N2O) from fuel consumption in total man-made emissions were % 90.4, %11.5 and % 14.5 respectively in 1995 and % 92.6, % 7.7 and % 18.5 in 2000. The shares of sectors in fuel consumption have also changed: while in 1995 %28 of CO2 emissions were generated by electricity production, % 29 by manufacturing industry, and % 21 by residential, agriculture, etc., in 2000 % 34 were generated by electricity production, % 32 by manufacturing industries, % 17 by transportation and % 16 by agriculture and other sectors [6].

Agricultural activities that produce greenhouse gases are animal farming, usage of nitrogenous fertilizer, burning stubbles and rice production. In Turkey, methane emission is generally forming %95 from ruminants, %3,5 from rice production and %1,5 from burning stubbles, in the period of 1970-1998. When we consider the total emission in Turkey, in 1990 while %9,03 of the emissions of greenhouse gases cause from agricultural activities, this rate decreased %6,10 in 1997.

Impacts On Biodiversity

Although biological diversity provides many benefits at local, national and global levels, it is being serious lost [3]. In Turkey, the biological richness is very amazing just like racing the continents. For example, in the continent of Europe, while the total number of the plant species is 12000, only in Turkey the number of the plant species is equal to this number. Also in Turkey like the forests, grazes and pastures, the ecosystems are consists diversity in both structural and operational. Turkey has got %75 plant species' of Europe.

In Turkey, one of the threats for biodiversity is agriculture. The impacts like inappropriate use of agricultural lands, chemicals and fertilizer usage effect biodiversity negatively. In agriculture sector, burning stubble and ground, causes the loss of animals.



With the aim of irrigation of agricultural lands, in some water lands, biological efficiency and activities are getting less. The consequence of damage in Akdeniz, Ege and Marmara regions, today the more of spineless animal livings are only 1/10 of the number that determined earlier 10-15 years [17].

TURKEY'S AGRI-ENVIRONMENT POLICY

Also in Turkey like other some countries, it is aimed with agricultural policy to increase the agricultural production. The five year development plans, which are prepared by The State Planning Organization (SPO), are the important sources which shape the policies on agriculture and environment, as on other areas, in Turkey. The developments regarding the environmental policy in Turkey started in mid-70s with the third five-year development plan and gained speed following the 1980s [2].

We see that the relation between agriculture and environment was not considered in the 7th five year development plan (1996-2000), in which a sustainable development approach was taken as the basis. However, the National Environment Action Plan (NEAP), which showed the importance attached to the environmental pollution and problems, was prepared in this planning period. NEAP points out the undertakings bearing priority, and defines the pollution resources that constitute threat from the environmental health point of view. The studies for NEAP commenced in 1995 and ended in 1998.

The agri-environment policies were considered in detail for the first time in the 8th five year development plan (2001-2005). The plan emphasized, in aim, principles and policies, the use of natural resources in a sustainable way, and the establishment of a system for the protection and restoration of gene resources. It also calls for acting with agricultural policies towards a well-balanced agricultural development well-matched with the environment. It was declared in the 8th plan that the base will be to reduce the negative effects of agricultural production on the environment. "In this sense, the use of natural resources and resources in harmony with the environment in fertilizers, pharmaceuticals and watering in addition to the precautions to be taken, will become widespread, the input assistance in fertilizers and pharmaceuticals will be encouraged". The plan also includes expressions that alternative contestation methods like integrated pestilent management and biological contention would be given the first priority, and that the international commitments in agricultural contestation, food safety, ecological balance and the environment factor would be taken into consideration.

From this point of view, the environmental extent of agriculture was considered in such detail for the first time in Turkey in this development plan and concrete suggestions like decreasing the input subsidies, encouragement of ecological production, and prioritization of biological contestation methods were stated [2].

The heading "The Protection of the Environment and the Development of the Urban Substructure" is included in the basic aims of the 9th five year development plan (2007-2013). However, the relation between the agriculture and environment has little space in the 9th plan and the previous concrete suggestions are missing in it [14].



The Ministry of Agriculture prepared, also considering the conformity with the EU, the Agricultural Strategy 2006-2010 document in order to facilitate decision taking in the sectors related with agriculture, and to develop the sector towards the development aims and strategies and to constitute the basis of the Agricultural Frame Law and the secondary legislation which will be prepared based on this law. Environmentally Based Agricultural Land Protection Support (ÇATAK) is also included in the document among the agricultural support means.

The ÇATAK program foresees payments to be made in the areas to be defined by the Ministry according to the implementations defined in 3 different categories:

1. category: Struggle against erosion and the improvement of the territory,

2. category: Environment-friendly agricultural techniques and cultural applications.

3. category: Grassland and meadow establishment, building of constant vegetation and multi-years feed grain plants.

Turkey also constituted its National Rural Development Strategy in that year. Under the heading "The Protection and Development of Rural Environment", which is the fourth aim of the Strategy , the priority is given to the "development of environmental agriculture applications"; and the basic aim of this priority is: the development of the agricultural activities together with environmental protection measures, the protection and development of the features of agricultural and grassland areas with natural and local prosperity or under risk, and in this context, spreading the planning of agricultural products suitable with local ecology [13]. In order to facilitate this, it was stated that precautions will be taken towards the;

- development of integrated agricultural basin programs,

- spreading of organic agricultural practices,

- tracking of the environmental pollution resulted from agricultural activities,

- studies to develop agricultural and grassland areas, although the qualities are imperfect, which may be restored, and

- protection against natural disasters and activities towards these will be supported.

Agriculture Law No 5488, aiming at determining the required policies for the development and support of agriculture sector and rural areas in accordance with development plans and strategies, was adopted on April 18, 2006 (Table 2). The law formed the legislative basis for the implementation of the "Agricultural Strategy Paper" for 2006-2010. Although the law is not completely in line with EU Common Agricultural Policy, it is considered as an important step for transition to CAP.



Table 2, implemented in accordance with the priorities, within the context of EU Legislation and National Programme.

Table 2 : Some Law and Legislation

1998- Law of Pasture (25.02.1998 dated and 23272 numbered O.G.)

2001- Regulation of Control of Soil Pollution (10.12.2001 dated and 24609 numbered O.G.)

2001- National Biodiversity Strategy Activity Plan

2003- European Environment Agency and the European Environment Information and Observation Network Agreement (01.05.2003 dated O.G)

2003- Regulation of Animal Genetic Resources Conservation (21.06.2003 dated and 25145 numbered O.G.)

2003- Regulation of Environmental Impact Assessment (EIA) (16.12.2003 dated)

2004- Regulation of Control of Waste Oils (21.01.2004 dated)

2004- Regulation of The Protection of Waters Against Pollution Caused by Nitrates from Agricultural Sources (18.02.2004 dated and 25377 numbered Official .Gazette)

2004- Climate Change Framework Agreement (24.05.2004 dated)

2004- Law of Conservation of Animals (01.07.2004 dated)

2004- Regulation of Good Agricultural Practices (8.9.2004 dated and 25577 numbered O.G.)

2004- 5262 Numbered Law of Ecologic Agriculture (03.12.2004 dated and 25659 numbered R.G.)

2005- Regulation Concerning the Fundamental and Application of Ecologic Agriculture (10.06.2005)

2004- Regulation of Water Pollution Control (31.12.2004 dated and 25687 numbered O.G.)

2005- Law of Soil Conservation and Land Use (5403) (03.07.2005 dated O.G.)

2005- Regulation of Conservation of Agricultural Lands and Use (25.03.2005 dated and 25766 numbered O.G.)

2005-ÇATAK(Environmentally Based Agricultural Land Protection Support)(According to the Ministry of Agriculture and Village Affairs) (2005/9230 numbered BKK-15.11.2005 dated and 25994 numbered O.G.)

2006- National Rural Development Strategy (T.C. O.G., 2006)

2006- Law of Agriculture(Law Numbered: 5488, Dated: 18.04.2006)

2006- ImplementingRegulation on Reduction of Substances that Deplete the Ozone Layer(26176 numberedO.G dated 23 May 2006).

2006-Law of Environment (13.05.2006 dated and 26167 numbered O.G)



Since 2001, Turkey has been implementing an agricultural reform programme, the Agricultural Reform Implementation Project (ARIP), with support from the World Bank. The project has been extended for the period 2005-2007 and restructured as also to include some EU-type rural development measures (i.e.Village Based Participatory Investment Program-VBPIP). VBPIP implementation started in 2005 in 16 provinces and the program is extended to include all provinces in 2006. After the last progress report period, some progress has been made both in Direct Income Support (DIS) and National Farmer Registration System (NFRS) legislation as described below.

The new Law on Environment has very recently been enacted revising the previous Law to reflect the developments in the field of environment (Official Gazette No. 26167 dated 13 May 2006). Thus, participatory and precautionary approach, sustainable development principle, tariffs, polluting sources, use of economic instruments, enforcement capacity improvement, increased fines and penalties, support to small and medium sized municipalities are some important measures brought by the new Law. Regarding sanctions, Circular on Fines Charged based on the Law on Environment was also published in the Official Gazette No. 25791 dated 7 June 2006.

CONCLUSION

Turkey also has a very important step for agri-environment scheme, in the framework for adaptation process for European Union. Some legal arrangements that will lessen the environmental effect of agriculture and in the other hand will increase the good farming practice are achieved. Turkey's movement for composing new policies in this issues and implementing the policies that are also existed and will be compose even for the country and also local level, should be seen for an opportunity to protect the owned natural resources and environmental assets. As a matter of persuasiveness of Turkey, agri-environment policies shouldn't be in contradiction with other agricultural policy instruments.

Agriculture is the main user of land and water; as a result, agricultural activities can have a significant impact on natural resources with particularly important effects on the quality and flows of water and on natural habitats. Modern agricultural production methods cause of problems of environmental damage. It is also effective carrying out agricultural policy in Turkey. Economic activities consist in changing resources or inputs into products or services. Thus, all activities directly or indirectly affect and interact with their environment (i.e. ecological, economic and social systems). For example, air and water temperatures determine the types of agriculture, forestry and fisheries that are possible and affect productivity, while market characteristics affect their viability.

Agriculture may play a key role in Turkey's local economy, either through the production of food or by providing raw materials to industry, and thus has strategic and political significance. Resource loss and ecosystem degradation will only be halted if appropriate policies are adopted and implemented. Growing awareness of the environmental, social and economic consequences of policy failure that are of global concern, such as global warming or loss of biological diversity, is fortunately beginning to put pressures on governments to



rectify present policies and create an appropriate environment policy. In spite of developments, at present carrying out agricultural policy focus the agricultural production in Turkey. Environment is not of importance in agricultural policy. Now, it is known, modern agricultural production methods cause environmental damage. Conventional agricultural policy is also not sufficiency to solve environmental problems originating from agriculture. Then, it can be suggest an alternative approach towards agri-environment policy for Turkey.

More specifically, the following measures should be adopted:

- legislation related to the long-term sustainability of the natural environment;
- decentralized structures established on the basis of effective participation at local level;
- incentives for producers,
- provision of support that cannot be covered from local resources.

Although high rates of population and failure of agricultural and environmental policies produce environmental pressures on these areas, Turkey still has a great amount of preserved natural habitats and ecosystems.

REFERENCES:

[1] AAFC (Agriculture and Agrifood Canada); "Agriculture and the Environment", Ottawa, www.agr.gc.ca/policy/environment/water_e.phtml, 2006

[2] Atış, E.; *Tarım ve Çevre, Türkiye'de Tarım,* TKİB Strateji Geliştirme Başkanlığı, Ankara, 2006, 163-179 pp.

[3] Atış, E.; Erdem(Salalı), H.E.; "Biyolojik Çeşitliliğin Ekonomik Değerinin Belirlenmesi", Üçüncü Sektör Kooperatifçilik Dergisi, 2005.

[4] DPT; www.dpt.gov.tr, 2001 (a).

[5] DSİ; Toprak Kirliliği, www.dsi.gov.tr/english/topraksue.htm, 2006.

[6]

http://reports.eea.europa.eu/state_of_environment_report_2005_1/en/SOER2005_Part_C.pdf, 2005,

EEA:

[7] FAO; "Food and Agriculture Organization", www.fao.org/ag/magazine/0612sp1.htm, 2006.

[8] GNF; Global Nature Fund, http://www.globalnature.org/docs/02_, 2006.

[9] Legg, W.; Potier, M.; Reconciling Agriculture and Environment, The OECD Observer, No:210 February/March, 1998, Paris, 1998.

[10] Ministry of Environment; Agriculture and Rural Development, Agenda Item 1: Turkish Agricultural Policy Screening, 23-26 January 2006, Chapter 11, 2006 (a).

[11] Ministry of Environment; www.styd-cevreorman.gov.tr/toprak_kirliligi.htm, 2006 (b).

[12] OECD; Environmental Performance Reviews-Turkey, OECD Publications, Paris, 1999.

[13] Official Journal; (T.C. Resmi Gazete, 2006(a)), Ulusal Kırsal Kalkınma Stratejisi, R.G. Sayı: 26070, 04.02.2006, 2006 (a).

[14] Official Journal; (T.C. Resmi Gazete, 2006(b)), Dokuzuncu Kalkınma Planı (2007-2013),



R.G. Sayı: 26215, 01.07.2006, 2006 (b).

[15] Oskam, A.; Burrel, A.; Temel, T.; Berkum, S.; Longworth, N.; Vilchez, I.M.; *Turkey in the European Union – Consequences for Agriculture, Food, Rural Areas and Structural Policy*, Final Report, 1 December 2004, Wageningen University, 2004.

[16] Scialabba, N.(ed.); *Integrated coastal area management and agriculture, forestry and fisheries. FAO Guidelines.* Environment and Natural Resources Service, FAO, Rome, 1998; 256 pp.

[17] TÇV; Environment Foundation of Turkey, www.cevre.org, 2003.

[18] Tilman, D.,; Global environmental impacts of agricultural expansion: The need for sustainable and efficient practices, 1999.

[19] TKB; Organik Tarım Strateji Belgesi- Taslak (2006-2020), http://www.tarim.gov.tr, 2006.
[20] Yılmaz, K.T.; Alphan, H.; İzcankurtaran, Y.; Tarım ve Kıyı Ekosistemlerinin Yönetimi, Türkiye 2.Ekolojik Tarım Sempozyumu, 14-16 Kasım 2001, Antalya, 2001.





THE EFFECTS OF ECONOMIC GROWTH AND EDUCATION LEVEL ON AIR-WATER POLLUTION IN OECD COUNTRIES: A PANEL TIME SERIES ANALYSIS

Ercan SARIDOĞAN*Sinan SARISOY* M. Kemal BEŞER*

^{*}Marmara University, Department of Economics ^{*}Marmara University, Department of Public Finance, ^{*}Marmara University, Department of Econometrics, ercan-saridogan@marmara.edu.tr,ssarisoy@hotmail.com,mkbeser@marmara.edu.tr

In this paper, it is investigated the effects of the economic growth and education level on the air-water pollution in OECD countries for the period 1990-2000 by using panel time series techniques which are panel unit roots, panel cointegration, panel VAR, panel impulse-response and panel variance decomposition techniques for high-income level OECD countries whether the higher economic growth and education level improve environmental quality or not.

According to the Kuznets curve which is hypothesized relationship between various indicators of environmental degradation and income per capita, in the early stages of economic growth degradation and pollution increase, but beyond some level of income per capita the trend reverses, so that at high-income levels economic growth leads to environmental improvement. This implies that the environmental impact indicator is an inverted U-shaped function of income per capita. As long as countries develop in terms of income per capita and human capital, they want to live in the better environmental conditions. For this reason, they are ready to improve environmental conditions not only technological improvements but also legal regulations.

Key Words: Economic Growth, Air-Water Pollution, Environmental Kuznets Curve, Panel Time Series

Jel Classifications: Q53, Q56, C32, C33

1. INTRODUCTION

The relationship between economic growth and environmental pollution has been a source of great controversy for a very long time. The growth of the economy measures in terms of increase in its national output, or Gross National Product (GNP). GNP is a measure of the level of economic activity in the nation. The environmental effects of economic activity attract increasing attention.

The costs of benefits of economic growth can affect the social or environmental domains in rather different ways. The question of sustainability is largely dependent on which type of costs and benefits are considered. Some recent studies suggest that the costs of economic growth are higher than its benefits, but others disagree (Islam et al., p.151).

^{*} Research Assistant, Marmara University, Department of Economics

Corresponding Author, e-mail: ercan-saridogan@marmara.edu.tr,

Tel: +902125079925-1326; Ressam Namik Ismail sk. No:1; PK: 34590 Bahcelievler/Istanbul/Turkey

^{*} Research Assistant, Marmara University, Department of Public Finance, e-mail: ssarisoy@hotmail.com

^{*} Research Assistant, Marmara University, Department of Econometrics, e-mail: mkbeser@marmara.edu.tr



At one extreme has been the view that greater economic activity leads to environmental degradation and ultimately to possible economic and ecological collapse. At the other extreme is the view that those environmental problems worth solving will be addressed more or less automatically as a consequence of economic growth. The longevity and passion of this debate has, in part, been a reflection of the lack of substantial empirical evidence on how environmental quality changes at different income levels. Compilation of such evidence has been constrained by the absence of data for a large number of countries (Shafik, p.757).

One of the variables in this study is education level which is very important for environmental concerns. Education plays an important role in environmental protection policies of a country. In this paper we are firstly investigating the relationship between economic growth and environmental corruption which is illustrated by environmental Kuznets curve (EKC). After reviewing the empiric literature on EKC we apply an empirical analysis on some selected OECD countries to examine the validity of this relationship.

2. ENVIRONMENTAL KUZNETS CURVE

The hypothesis of an inverted U-shaped relationship between growth in per capita income and environmental degradation, as illustrated by the environmental Kuznets curve, has recently been the subject of much empirical investigation.

Kuznet's name was apparently attached to the curve by Grossman and Kruger (1993), who noted its resemblance to Kuznet's inverted-U relationship between income inequality and development. In the first stage of industrialization, pollution in the environmental Kuznets curve world grows rapidly because people are more interested in jobs and income than clean air and water, communities are too poor to pay for abatement, and environmental regulation is correspondingly weak. The balance shifts as in come rises. Leading industrial sector become cleaner, people value the environment more highly, and regulatory institutions become more effective. Along the curve, pollution levels off in the middle-income range and then falls toward pre-industrial levels in wealthy societies (Dasgupta et al, p.147).

An explanation of the EKC has been pursued on many lines. Two major explanations are as follows: (i) use of environment as a major source of inputs and a pool for waste assimilation increases at the initial stage of economic growth, but as a country grows richer, structural changes take place which result in greater environment protection; and (ii) viewed as a consumption good, the status of environmental quality changes from a luxury to a necessary good as an economy develops. Phenomena like structural economic change and transition, technological improvements and rise in public spending on environmental R&D with rising per capita income level are considered to be important in determining the nature of the relationship between economic growth and environmental quality (Dinda et al, p.410).





Some analysts used the EKC argument while pollution might increase with growth, once society became richer and pollution reached unacceptable levels, additional resources would be expended to reduce pollution. Likewise, as resources became scarcer, market prices would increase to prevent natural resource exhaustion by encouraging shifts to substitutes or through technological improvements that increased resource supply or reduced levels of equilibrium usage. Even if the price mechanism failed, previous predictions of resources exhaustion had proven incorrect, and so any future predictions would also be incorrect (Islam et al., p.151).

Furthermore, the EKC only describes a relationship between economic growth and specific pollutants, such as suspended particular matters and sulfur dioxide. For these pollutants the estimated relationship between per capita income and pollution emissions is highly sensitive not only to the choice of functional form but also to the data, that is, the sample of countries used and the sampling duration. For instance, the explanatory power of a polynomial in GDP per capita account for a much smaller fraction of per capita pollution emission in high income countries than in low and middle income countries. For high income countries the best functional form is not quadratic in GDP per capita but cubic. This implies that for very high levels of GDP environmental degradation starts to increase again (Magnani, p.433).

EKC hypothesis may also depend on some other factors, such as industrial structures, technological progresses and environmental policies, etc. Therefore, estimating the EKC hypothesis without testing other important determinants of pollution probably leads to a biased result. One important critique for the existing empirical EKC studies is that, although in many theoretical models pollution is assumed as both an input and byproduct of production, these studies are based on a single polynomial equation where there is no feedback effect from pollution to economic growth and therefore pollution is viewed only as the outcome of economic growth. The validity of ignoring this feedback effect should depend on that there is no simultaneous relationship between these two variables. However, as we know, in real world, pollutant emission may reduce production either through the restriction of environmental input's supply via environmental degradation or the loss of workdays due to health problem caused by pollution. Thus, economic growth and the environmental quality are jointly determined, and estimating the relationship only by a single polynomial equation might probably produce biased and inconsistent estimates (Shen, p.2).



Several theoretical models which aim to explain the EKC can be found in the literature. Buchholz and Cansier (1980) analyze the possibility of balanced growth with ecological constraints in a Harrod Domar framework. They also allow for the case that environmental technical progress is not exogenous but requires expenditures. They find that in their model the possibility of sustainable growth depends on its parameterization. Lopez (1994) treats emissions as external effects which are internalized by a Pigouvian tax. Furthermore, exogenous technical progress and endogenous preferences are assumed. The relation between the level of pollution and the income level then depends on the elasticities of substitution of goods and the risk preference of the households. In Jones and Manuelli (1995), the environment is modeled as a normal good where the demand rises with an increasing income. Since emissions are treated as externalities, a governmental regulation mechanism is implemented (taxes or qualitative regulations of production technique). Using an overlapping generations model it is shown how the interaction of individual optimal decision making and collective regulation may lead to an EKC, but also a N-shaped curvature is possible. Stokey (1998) addresses alternative political mechanisms of regulation (taxes versus legal restraints). Using critical assumptions regarding the technology an inverted V-shaped curvature of the pollution level is derived. In Seldon and Song (1995), the EKC is derived from a very simple model which includes abatement efforts. The straightforward inference of the EKC depends on very strong assumptions regarding the effectiveness of the abatement function. In Andreoni and Levinson (1998), neither technical progress, nor changes of preferences or institutional regulations of the price system are necessary to obtain an EKC. The environment is assumed to be a normal good and households maximize their utility. The crucial point for the derivation of the EKC is similar to Seldon and Song (1995), that the abatement function has increasing returns of scale. The justification of this assumption is discussed later on (Pasche, p.382).

A more extensive overview about models of EKC can be found in Stokey (1998), Andreoni and Levinson (1998), Vogel (1999). Only a few approaches take into account that technical progress (or pollution abatement) requires continuing and eventually growing efforts, hence a partial waiver of consumption. A part of total income has to be spent for current environmental expenditures or investment into 'green' technology. If such efforts are taken into account, as in Andreoni and Levinson (1998), Seldon and Song (1995), problematic assumptions about the abatement function are crucial for the existence of an EKC in this model (Pasche, 382). Selden and Song (1994) focused exclusively on air pollutants in their examination of possible EKC relationships. They studied emissions of SO2, NOx, SPM and CO. Emissions were measured as kilograms per capita on a national basis with pooled crosssection and time-series data drawn from World Resources Institute. The data were averages for 1973-75, 1979-81 and 1982-84. There were 30 countries in their sample: 22 high income countries, 6 middle incomes and 2 low incomes. Their results indicated that emissions of CO were independent of income, whereas emissions of other pollutants followed an EKC pattern (Jha and Whalley, pp.21-22).



3. EMPIRICAL ANALYSIS

In this section, we analyze the relationships among education, economic growth, and water pollution variables, which are, EDU; the School enrollment, tertiary (% gross), GDPC; GDP per capita, PPP (current international \$), AIRPOLT; CO2 emissions (kg per 1995 PPP \$ of GDP), and WATERPOLT; Organic water pollutant (BOD) emissions (kg per day per worker).

The analysis period covers 1990-2000 for the 18 high income OECD countries. The data set and country set included analysis mostly depended on the availability of the data. The data source is World Development Indicators (WDI-2004 and WDI-2006).

The econometric analysis consists of the panel time series technique that includes panel unit root analysis, panel cointegration and the panel VAR.

The traditional augmented Dickey–Fuller (ADF)-type tests of unit root suffer from the problem of low power in rejecting the null of stationarity of the series, especially for short-spanned data. Recent literature suggests that panel-based unit root tests have higher power than unit root tests based on individual time series. A number of such tests have appeared in the literature. Recent developments in the panel unit root tests include Levin et al. (LLC) (2002), Im et al. (IPS) (2003), Maddala and Wu (1999), Choi (2001) and Hadri (2000).

Panel unit root test for the variables of EDU, GDPC, WaterPolt and AirPolt, is stationary in first difference according to the test of Im-Peasran&Shin and ADF-Fisher.

| Test | L | .evinLin&Chu | Im,Peasaran&Sh ADF-Fish | | |)F-Fisher | | |
|--|-----------|----------------|-------------------------|----------------|----------|----------------|--|--|
| Variable | LEVE L | DIFFERENC E | LEVEL | DIFFERENC E | LEVEL | DIFFERENC E | | |
| AirPolt. | - 1.29 | -7.1** | 0. 66 | -2.9* | 8 2 | 95** | | |
| EDU | - 3.45** | -5.7** | - 0.55 | - 1.954* | 3 0 | 101** | | |
| GDPC | - 2.06* | - 12.165** | 1. 20 | -1.79* | 9. 57 | 126** | | |
| WaterPolt. | - 1.6 | -5.92** | 0. | 3.15** | 2 8.7 | 127** | | |
| *Significant at %5 significance level with trend and intercept **Significant at %1 significance level | | | | | | | | |

Table 1. 1 Panel Unit Root Test Results



Pedroni (1995 and 2004) provides a technique that allows for using panel data thereby overcoming the problem of small samples, in addition to allowing for heterogeneity in the intercepts and slopes of the cointegrating equation. Pedroni's method includes a number of different statistics for the test of the null of no cointegration in heterogeneous panels. A group of the tests are termed "within dimension" (panel tests) and the other group as "between dimension" (group tests). The "within dimension" tests pool the data across the "within dimension". It takes into account common time factors and allows for heterogeneity across members. The "between dimension" tests allow for heterogeneity of parameters across members, and are called "group mean cointegration statistics".

This test dealt with residual-based tests for cointegration and spurious regression, allowing for different assumptions on the homogeneity and heterogeneity of the panel data. Pedroni's model allows for different intercepts (fixed effects), different slopes, endogenous regressors, and, heterogeneous long-run variance covariance matrices. This test also derives the asymptotic distributions of the tests proposed. The null of Pedroni's tests is "no cointegration". Pedroni later revised/extended this working paper to one dated 1997 in which he derived seven explicit tests for cointegration in panel data under various different settings.

| panel v-stat | -0.32028 | group rho-stat | 3.70379* | | | | |
|--|------------------------------|----------------------------|-------------------|--|--|--|--|
| panel rho-stat | 2.02675* | group pp-stat | -8.99003* | | | | |
| panel pp-stat | -7.83033* | group adf-stat | -6.34655* | | | | |
| panel adf-stat | -4.05298* | | | | | | |
| Nsecs $= 18$, Tperiods | = 11, no. regressors $= 3$ | | | | | | |
| Notes: All reported v | values are asymptotically di | istributed as standard nor | mal. The variance | | | | |
| ratio test is right-sided, while the other Pedroni tests are left-sided. A * indicates the rejection | | | | | | | |
| of the null of unit | root or no cointegration a | t the 0.05 level of signi | ficance. NT=198. | | | | |

Table 1. 2 Computed Panel Statistics For The Pedroni Panel Cointegration Tests

In order to analyze the cointegration relationship among the variable we use the techniques by developed Pedroni (1995). The results in Table 1.2, table 1.3, table 1.4 and table 1.5 show that there is a panel cointegration among the EDU, GDPC, WaterPolt. and AirPolt. variables.

| Table 1.3 | 8 Panel | Group | Fmols | Results |
|-----------|---------|-------|-------|---------|
|-----------|---------|-------|-------|---------|

Estimations undertaken with Rats 6.01

| Dependent Variable: AirPolt.kg | | | | | | | | |
|--|-------------|-------------|--|--|--|--|--|--|
| AIRPOLT.KG | Edu | GDPC | | | | | | |
| NA | -0.001 | - 0.01 | | | | | | |
| (NA) | (-5.62e+03) | (-1.43e+06) | | | | | | |
| (t-stats in parentheses) $N = 18$, $T = 11$, max-lag = 3 | | | | | | | | |
| Common Time Dummie | s Included | | | | | | | |



Johansen's VAR procedure and Pedroni's heterogeneous panel cointegration test only for the existence of a long-run relationship. They both indicate the presence or absence of a long-run relationship between the variables, but do not indicate the direction of causality when the variables are cointegrated. Causality is traditionally tested by the standard two-step EG causality procedure, using an error-correction model.

Table 1.4 Computed panel statistics for the PEDRONI panel Cointegration Tests

| panel v-stat | -0.12651 | group rho-stat | 4.25931* | | | | |
|---|-------------------|----------------------------|----------------|--|--|--|--|
| panel rho-stat | 2.68628* | group pp-stat | -2.44831* | | | | |
| panel pp-stat | -2.90089* | group adf-stat | -2.34063* | | | | |
| panel adf-stat | -2.1141* | | | | | | |
| Nsecs = 18, Tperiods = 11, no. regressors = 3 | | | | | | | |
| Notes: All reported values are as | symptotically dis | tributed as standard norma | I The variance | | | | |

Notes: All reported values are asymptotically distributed as standard normal. The variance ratio test is right-sided, while the other Pedroni tests are left-sided. A * indicates the rejection of the null of unit root or no cointegration at the 0.05 level of significance. NT=275. Estimations undertaken with Rats 6.01

Table 1.5 PANEL GROUP FMOLS RESULTS

| Dependent Variable: WaterPolt. | | | | | | | | |
|--|---------------|-------------|--|--|--|--|--|--|
| WaterPolt. | Edu | GDPC | | | | | | |
| NA | -0.01 | 0.001 | | | | | | |
| (NA) | (-1.57e+04) | (-5.86e+06) | | | | | | |
| (t-stats in parentheses) $N = 18$, $T = 11$, max-lag = 3 | | | | | | | | |
| Common Time Dumm | nies Included | | | | | | | |

One of the problems facing a researcher when conducting causality analysis is that sufficiently long time series, that are necessary for causality tests, may not currently be available. Acknowledging the problems associated with small samples, panel data are increasingly used to test for causality between variables. A new line of tests based on panel data is developing. Using panel data allows us to gain more observations by pooling the time series data across sections, leading to higher power for the Granger causality tests. To test for panel causality, the most widely used method in the literature is that proposed by Holtz-Eakin et al., 1988 and Holtz-Eakin et al., 1989. Their time-stationary VAR model is of the following form:

$$Y_{it} = \alpha_0 + \sum_{j=1}^m \alpha_j Y_{it-j} + \sum_{j=1}^m \delta_j X_{it-j} + f_{yi} + u_{it}$$

$$X_{it} = \beta_0 + \sum_{j=1}^m \beta_j Y_{it-j} + \sum_{j=1}^m \phi_j X_{it-j} + f_{xi} + v_{it}$$
(1.1)



where Y_{it} and X_{it} are the two cointegrated variables, i=1,...,N represents cross-sectional panel members, and u_{it} and v_{it} are error terms. This model differs from the standard causality model in that it adds two term, f_{xi} and f_{yi} which are individual fixed effects for the panel member *i*.

In the equations above, the lagged dependent variables are correlated with the error terms, including the fixed effects. Hence, OLS estimates of the above model will be biased. The remedy is to remove the fixed effects by differencing. The resulting model is:

$$\Delta Y_{it} = \sum_{j=1}^{m} \alpha_j \Delta Y_{it-j} + \sum_{j=1}^{m} \delta_j \Delta X_{it-j} + \Delta u_{it}$$

$$\Delta X_{it} = \sum_{j=1}^{m} \beta_j \Delta Y_{it-j} + \sum_{j=1}^{m} \phi_j \Delta X_{it-j} + \Delta v_{it}$$

(1.2)

However, differencing introduces a simultaneity problem because lagged endogenous variables on the right-hand side are correlated with the new differenced error term. In addition, heteroscedasticity is expected to be present because in the panel data heterogeneous errors might exist with different panel members. To deal with these problems, an instrumental variable procedure is traditionally used in estimating the model, which produces consistent estimates of the parameters.

Assuming that the u_{it} and v_{it} are serially uncorrelated, the second or more lagged values of Y_{it} and Xit may be used as instruments in the instrumental variable estimation. Then, to test for the causality, the joint hypotheses $\delta j=0$ for j=1,...,m and $\beta j=0$ for j=1,...,m is simply tested. The test statistics follow a chi-squared distribution with (k–m) degrees of freedom. The variable X is said not to Granger-cause the variable Y if all the coefficients of lagged X in Eq. (1.2) are not significantly different from zero, because it implies that the history of X does not improve the prediction of Y. A widely used estimator for the system in (1.2) is the panel generalized method of moments (GMM) estimator proposed by Arellano and Bond (1991). This method has been shown to produce more efficient and consistent estimators compared with other procedures. We use dynamic panel system to estimate Panel VAR coefficients so that we use these coefficients to obtain panel impulse-response and panel variance decomposition coefficients.

In order to analyze panel causality among the variables, we use the two-stage least squares with instrumental variable approach (by developed Holtz-Eakin et al 1988). We run two different models that are:

- First model consists of variables in level: EDU, GDPC, WaterPolt. and AirPolt.,
- Second model consists of variables LGDP in first difference, EDU, GDPC, WaterPolt. and Air Polt.

Because of we want to observe the continuity of the causality among the variables, we include the lags from 1 to 2 in the VAR models.



| Table 1.6. Panel Causality Results for the Variables of EDU, GDPC and AirPolt. | | | | | | | | | | |
|--|-----------|--------|--------------------------------|-------------|-----------------------------------|--------------|-----|-----------------------------|------------|--|
| MODEL-1:La | og-Level | | MODEL-2:Log-Level | | MODEL-3:Log- Difference | | | MODEL-4: Log | Difference | |
| CAUSAL | ГГΥ | | CAUSALITY | | CAUSAL | CAUSALITY | | CAUSAI | .117 | |
| LAIRPOLT. Air- Pollution | LEDU | lag | LAIRPOLT. Air- Pollution | L GDPc | DLAIRPOLT. Air-Pollution DLEDU | | Lag | DLAIRPOLT. Air-Pollution | DLGDPc | |
| | | 1 | - | | ← | | 1 | - | | |
| - | | 2 | | | | | 2 | | | |
| Tabl | e 1.7. Pa | anel (| Causality Re | sults for t | the Variables o | of EDU, O | DPC | and WaterP | olt. | |
| MODEL-1:La | g-Level | | MODEL-2:L | og-Level | MODEL-3 Differen | :Log- nce | | MODEL-4: Log-Difference | | |
| CAUSAL | пу | | CAUSAI | JITY | CAUSALITY | | | CAUSALITY | | |
| Lwater Pollution | LEDU | lag | Lwater Pollution | LGDPc | DLwater Pollution | DLEDU | lag | DLwater Pollution | DLGDPc | |
| - | | 1 | | | - | | 1 | | | |
| - | | 2 | | | - | | 2 | | | |

In Table 1.6, Model-1 shows that there is causality from education to Air-pollution for the lag from 1 to 2 in log-level models. Model-2 shows that there is causality from GDPC to Air-pollution for the lag 1 in log-level models. Model-3 and Model-4 show that there is causality from education and GDPC to Air-pollution for the lag 1 in log-difference models.

In Table 1.7, Model-1 shows that there is causality from education to water-pollution for the lag from 1 to 2 in log-level models. Model-3 shows that there is causality from Education to water-pollution for the lag 1 in log-difference model.

If we observe the results of causality by models, education variable causes both air and water pollution. GDP variable is Granger causes air pollution in log-level model for 1 lag and in log-difference in 2 lag. As a result we argue that education variable has a significant effect on the air and water pollution, so that it is important to design education polices in order to prevent air and water pollution and on the other hand, economic growth has also significant affect on the air-pollution for this reason, it is important to appropriate design economic growth polices to prevent air pollution.

In order to analyze the interaction among the variables used in the model, impulse response functions of each variable to a one standard deviation shock is presented in Table.1.8 and 1.9. The impulse-response coefficients are obtained panel VAR Model estimation coefficients. Panel VAR Model is estimated by using dynamic panel data system GMM estimation.



| Response of LAIRPOLT | | | | Response of DLEDU | | | Response of DLGDPC | | |
|-----------------------------|--------------------------|--------|-----------|-------------------|--------|------------|--------------------|--------|-------|
| Per. | DLAIR POLTDLEDUDLGDPC | | DLAIRPOLT | DLEDU | DLGDPC | DLAIRPOLT. | DLEDU | DLGDPC | |
| 0 | 1,00 | 0,00 | 0,00 | 0,00 | 1,00 | 0,00 | 0,00 | 0,00 | 1,00 |
| 1 | -2,07 | 1,37 | -4,53 | -1,03 | 1,67 | -1,98 | -0,33 | 0,11 | 0,16 |
| 2 | 5,30 | -1,52 | 8,73 | 2,42 | 1,00 | 3,97 | 0,81 | -0,14 | 2,38 |
| 3 | -1,37 | 5,96 | -2,63 | -6,63 | 5,44 | -1,24 | -2,42 | 1,29 | -3,43 |
| 4 | 36,33 | -1,30 | 65,81 | 17,02 | -2,23 | 31,29 | 6,09 | -1,64 | 12,30 |
| 5 | 89,75 | 110,30 | 327,97 | -0,06 | 0,86 | -0,59 | 0,04 | -0,09 | 1,68 |

| Table | 1.8 Panel V | VAR | Impulse Response | Estimation | Results for | DLAIRPOL | F. DLEDU a | and DLGDPC |
|-------|-------------|--------|------------------|------------|--------------------|----------|--|------------|
| Labic | 1.0 I and | VI LIN | impulse Response | Louination | itesuits for | | $\mathbf{I}, \mathbf{D}\mathbf{L}\mathbf{L}\mathbf{D}\mathbf{C}$ a | |

The impulse-responses functions coefficients among the variables are seen in table 1.8 and 1.9. The first column in the figure presents responses of the variables to a one standard deviation shock on air pollution variable. The impulse-responses among the variables are volatile and responses high in five periods.

| Table | 1.9 Panel VAR | Impulse | Response | Estimation | Results | for | WATERPOLT, | DLEDU |
|--------|---------------|---------|----------|------------|---------|-----|------------|-------|
| and Dl | LGDPC | | | | | | | |

| Res | ponse of L | AIRPOLT | | Response of DLEDU | | | Response of DLGDPC | | |
|-----|------------|----------|----------|--------------------------|---------|----------|---------------------------|---------|----------|
| | DLWAT | | | DLWAT | | | DLWA | | |
| Per | ERPOL | | DLGDP | ERPOL | DLED | DLGDP | TERP | DLED | DLGDP |
| • | Т | DLEDU | С | Т | U | С | OLT | U | С |
| | 1.00000 | 0.00000 | 0.00000 | 0.00000 | 1.0000 | 0.00000 | 0.0000 | 0.0000 | 1.00000 |
| 0 | 0 | 0 | 0 | 0 | 00 | 0 | 00 | 00 | 0 |
| | - | | - | | | - | | | |
| | 2.671.71 | 1.23851 | 1.794.10 | 1.83586 | 0.7634 | 1.257.66 | 0.7376 | 0.1348 | 0.18662 |
| 1 | 5 | 7 | 3 | 9 | 16 | 7 | 98 | 67 | 6 |
| | | - | | - | | - | - | | - |
| | 7.84193 | 2.702.57 | 4.31461 | 3.911.71 | 2.7622 | 2.788.04 | 1.749.5 | 1.0117 | 0.70592 |
| 2 | 1 | 4 | 4 | 9 | 39 | 3 | 22 | 53 | 3 |
| | - | | - | | - | | | - | |
| | 2.113.44 | 8.63775 | 1.288.59 | 13.6157 | 3.195.1 | 5.97116 | 5.8686 | 1.556.7 | 3.14730 |
| 3 | 9 | 8 | 1 | 1 | 10 | 9 | 32 | 45 | 9 |
| | | - | | - | | - | - | | - |
| | 58.7742 | 2.241.39 | 34.3860 | 3.498.26 | 15.901 | 2.222.57 | 1.514.3 | 6.7717 | 9.267.67 |
| 4 | 3 | 9 | 9 | 9 | 13 | 9 | 25 | 67 | 8 |
| | - | | - | | - | | | - | |
| | 1.610.05 | 63.4097 | 9.572.54 | 100.267 | 3.592.7 | 56.9246 | 43.283 | 1.561.7 | 24.9397 |
| 5 | 0 | 5 | 4 | 4 | 63 | 8 | 45 | 25 | 6 |



The Variance Decomposition (VDC) shows the proportion of error variance in relevant variable due to one standard deviation shock of its own and other variables in the system. It provides information about the dynamic behavior of the model and the relative importance of each random disturbances or innovation and shows the proportion of the movements in the endogenous variable sequence as a result of its own shocks against shocks to other variables in the VAR Model. The VDC coefficients are obtained panel VAR Model estimation coefficients by using Blanchard-Quah (1989) decomposition. Panel VAR Model is estimated by using dynamic panel data system GMM estimation.

| Table | 1.10: | Panel | VDC | Estimation | Results | for | the | DLAIRPOLT, | DLWATERPOLT, |
|-------|--------|-------|-----|------------|---------|-----|-----|------------|--------------|
| DLED | OU and | DLGI | OPC | | | | | | |

| Variance Decomposition of DLAIRPOLT | | | Variance Decomposition of DLWATERPOLT | | | |
|-------------------------------------|------------|---------|---------------------------------------|-------------|---------|---------|
| Period | DLAIRPOLT. | DLEDU | DLGDPC | DLWATERPOLT | DLEDU | DLGDPC |
| 1 | 59,8300 | 0,0000 | 40,1600 | 5,2100 | 37,5312 | 57,2588 |
| 2 | 51,5900 | 18,6700 | 29,7500 | 32,4312 | 28,4429 | 39,1259 |
| 3 | 62,1300 | 6,0800 | 31,7900 | 27,4277 | 41,0141 | 31,5582 |
| 4 | 57,4400 | 13,3000 | 29,2600 | 34,4465 | 35,5723 | 29,9812 |
| 5 | 61,8100 | 8,5300 | 29,6600 | 32,0096 | 38,2034 | 29,7871 |
| 6 | 59,1600 | 11,1500 | 29,6800 | 33,2687 | 36,9892 | 29,7421 |
| 7 | 61,0400 | 9,4700 | 29,4900 | 32,7018 | 37,5530 | 29,7451 |
| 8 | 59,8100 | 10,4700 | 29,7200 | 32,9666 | 37,2917 | 29,7417 |
| 9 | 60,6400 | 9,8200 | 29,5400 | 32,8440 | 37,4129 | 29,7432 |
| 10 | 60,0900 | 10,2300 | 29,6800 | 32,9008 | 37,3567 | 29,7425 |

The VDC results for 1 to 10 lagged years are reported in Table 1.10. According to the VDC of the air pollution variable in Table 1.10, it can easily be seen that GDP has a contribution more than education on explaining the variations in the air pollution. Education has a little contribution. In contrast, as it is reported in the table, an effect of a one standard deviation of shock to water pollution variable is mainly explained by the rates of education and GDP variables. At the first lagged-year, GDP explains 57,25% of the change in water pollution, but the education explains 37,53% of it. At the second, third and the following lagged-years GDP have a diminishing, but education have almost an increasing effect on water pollution.

At the first lagged-year, 0% of variations in air pollution is explained by education and 40,16% explained by GDP. Education has a lower contribution only for the first lagged-year, but at the latter lag periods, it has the primary influence according to the first lagged-year. It seems that the share of education in explaining the variations in air pollution has increased even though GDP which is an indicator of economic growth is the main source of variations.

According to the bold numbers which are the fifth lagged-year for VDC of air pollution and the fourth lagged-year for VDC of water pollution, those lags are the turning points of the inverted U-shaped EKC.



By concerning those lags for the relevant pollution variables, the preceding lagged-years are the environmental Kuznets curve world grows rapidly because people are more interested in jobs and income than clean air and water. Likewise, after the turning point, the resources became in short supply; market prices would increase to prevent natural resource exhaustion by encouraging shifts to substitutes.

3. CONCLUSION

Water and air are common substances, but life cannot exist without them. Pollutants from industrialization are seriously degrading the quality of air and water. The relationship between economic growth and environmental pollution has been a source of great controversy for a very long time. The hypothesis of an inverted U-shaped relationship between growth in per capita income and environmental degradation, as illustrated by the environmental Kuznets curve hypothesis have questioned in empirical studies in recent years. This empirical study in addition argues that economic growth and education level may effect on air and water pollution and also shows that increase in GDP and education level have important effect on the air and water pollution.

According to the panel time series econometric techniques results of the empirical investigation of GDP, education and air-water pollution level in selected OECD countries between 1990 and 2000, we argue that both GDP growth and education variables have important effect and contribution on the air and water pollution. As a result, we conclude that it is especially important to design the economic growth and education policies efficiently to minimize air and water pollution.

REFERENCES:

- Arellano, M.; Bond, S.R. Some Tests of Specification for Panel Data: Monte Carlo Evidence and An Application to Employment Equations. Review of Economic Studies 1991, 58, 277–297.
- 2. Choi, I. Unit Root Tests For Panel Data. Journal of International Money And Finance **2000**, 20, 249–272.
- 3. Dasgupta, Susmita; Laplante, Benoit; Wang, Hua; Wheeler, David. Confronting the Environmental Kuznets Curve. Journal of Economic Perspectives **2002**, 16 (1), 147-168.
- 4. Dinda, Soumyananda; Coondoo, Dipankor; Pal, Manoranjan. Air Quality and Economic Growth: An Empirical Study. Ecological Economics **2000**, 34, 409-423.
- 5. Hadri, K. Testing For Stationarity in Heterogeneous Panel Data. Journal of Econometrics **2000**, 148–161.
- 6. Holtz-Eakin, D.; Newey, W.; Rosen, H.S. Estimating Vector Autoregressions with Panel Data. Econometrica **1988**, 56, 1371–1395.
- 7. Holtz-Eakin, D.; Newey, W.; Rosen, H.S. The Revenues-Expenditure Nexus: Evidence From Local Government Data, International Economic Review **1989**, 30, 415–429.
- 8. Im, K.S.; Pesaran, M.H.; Shin, Y. Testing For Unit Roots in Heterogeneous Panels. Journal of Econometrics **2003**, 115, 53–74.



- 9. Islam, Sardar M.N.; Munasinghe, Mohan; Clarke, Matthew. Making Long-Term Economic Growth More Sustainable: Evaluating the Costs and Benefits. Ecological Economics **2003**, 47,149-166.
- 10. Jha, Raghbendra; Whalley, John. The Environmental Regime in Developing Countries. NBER Working Paper Series **1999**, 7305, 21-22. http://www.nber.org/papers/w7305
- 11. Levin, A.; Lin, C.F.; Chu, C.S. Unit Root Tests in Panel Data: Asymptotic And Finite-Sample Properties. Journal of Econometrics **2002**,108, 1–24.
- 12. Magnani, Elisabetta. The Environmental Kuznets Curve, Environmental Protection Policy and Income Distribution. Ecological Economics **2000**, 32, 431-443.
- 13. Pasche, Markus. Technical Progress, Structural Change, and the Environmental Kuznets Curve. Ecological Economics **2002**, 42, 381-389.
- 14. Pedroni, P. Panel Cointegration; Asymptotic and Finite Sample Properties of Pooled Time Series Tests with an Application to the PPP Hypothesis. Indiana University Working Papers in Economics **1995**, No. 95–013
- 15. Pedroni, P. Panel Cointegration: Asymptotic And Finite Sample Properties of Pooled Time Series Tests With An Application To The PPP Hypothesis: New Results. Econometric Theory **2004**, 20(3), 597–627.
- 16. Shafik, Nemat. Economic Development and Environmental Quality: An Econometric Analysis. Oxford Economic Papers **1994**, 46, 757-773.
- 17. Shen, Junyi. A Simultaneous Estimation of Environmental Kuznets Curve: Evidence From China. China Economic Review **2006**, 17, 383-394.





QUALITY APPROACH IN PURSUE OF SUSTAINABLE MOBILITY

D. SUSNIENE, A. VALACKIENE

Kaunas University of Technology Panevezys Institute, Lithuania kalbud@midi.ppf.ktu.lt

Now we are living in urban systems where mobility plays a very strong role in quality of life of residents though pursuit of sustainable mobility presents a challenge. Actions to limit the environmental and other costs of traffic movements must be reconciled with aspirations for economic growth and socials demands for mobility. When faced with the necessity to travel, an individual's natural desire is for a personal mode of transport that is flexible, independent and that is perceived as fast. The only reasonable way in which to reconcile individual aspirations and the will of all stakeholders in public transport, is to provide public transport services of the highest possible quality in a way that will persuade a large number of inhabitants to resist the temptation to use individual modes, to give public transport a try and become regular public transport users.

Keywords: sustainable development, mobility, total quality management, service quality, public transport

Introduction

The nation's growth and the need to meet mobility, environmental, and energy objectives place demands on public transit systems. Transport forms an essential backbone for socioeconomic development, but if not developed sustainably it also imposes significant costs on society in terms of environmental and health impacts. Current systems, some of which are old and in need of upgrading, must expand service area, increase service frequency, and improve efficiency to serve these demands. The intensive development of sophisticated infrastructure, that is one of the major prerequisites to economic and social development, is inevitable across EU new member states including Lithuania. The prioritization of transport infrastructure (roads, railways, ports, airports, bridges, stations and logistic centres) is seen as an important step in the extension of the EU and the European market to the East [3].

Many people see the current trends in transport activity as unsustainable, with traffic growth leading to greater congestion, increasing emissions of carbon dioxide and depletion of fossil fuels. Yet the pursuit of sustainable mobility presents a challenge [1]. Actions to limit the environmental and other costs of traffic movements must be reconciled with aspirations for economic growth and social demands for mobility. The solution is widely perceived to lie in an integrated approach, combining pricing instruments, new technologies and other policy actions including "temporary structural change, such as offering auto drivers a temporary free bus ticket, which may be an important travel demand management tool for converting automotive travel demand to public-transport travel demand" [4]. The 'decoupling' of transport growth from economic growth and the shifting of traffic from road to rail, water and public transport are two important objectives of the sustainable development strategy [10].



Car traffic dilemma and public transport

In many cities, the success of the car is now the most serious threat to the freedom and mobility we were given by the car in the first place [5]. Car traffic congestion is a growing problem due to the huge number of cars, and it leads to many other problems, for example environmental and aesthetic problems. There is an impact on the efficiency of public transport services as buses, as well, are stuck in the middle of the congestion.

The car traffic involves problems:

- Longer traveling times for car drivers and public transport (congestion)
- Pollution (noise and air)
- Traffic safety (also for public transport)
- Much city space is occupied for car lanes and parking places
- Disturbance of outdoor activities.

The philosopher O. Thyssen has explained the car paradox extremely precisely:

"When freedom of transport extends from being the privilege of the elite to becoming everybody's right, the problem will be that everybody's freedom undermines every-body's freedom. It is a particular problem, which arises collectively and unintentionally. Nobody created it and nobody is able to solve it. One's own contribution is just a single drop in the ocean. So we continue to supply each our own drop, and altogether they produce an ocean of problems."

The car traffic dilemma is that more success brings along larger problems for car travelers and other travelers. But increasing the capacity through widening of the roads does not solve the problem. No city has ever solved the traffic problem by giving more space to cars and parking [6; 7]. If instead we convert car traffic into public transport we shall experience a better service in public transport with higher traveling speed and higher reliability.

The explanation is simple. Car traffic means low capacity of infrastructure, since a single car requires 22.1 m^2 per traveler and a bus only 1.2 m^2 per traveler {9}. Therefore, when a limited space is available and maximization of street capacity is wanted it requires a limitation of the car use and an intensification of the public transport. This is the way of maintaining maximum mobility. Therefore, the conclusion is to obtain livable cities, car traffic must be limited, and at the same time public transport must be upgraded in order to obtain mobility.

Need for quality approach

Research is necessary to solve operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the transit industry. The intent of this research was to identify, evaluate, and recommend applications of potentially successful methods of implementing total quality management (TQM) in public transportation to increase ridership through improved customer satisfaction, to increase productivity, and to reduce cost.



TQM is a comprehensive and long-term transformational process. As a result of this process, an organization moves from a traditional, outdated mode of operating to a newer, more progressive way of running the enterprise (see table 1).

Table 1

Organizational characteristics

| | OUTMODED CHARACTERISTICS | FUTURE-ORIENTATED CHARACTERISTICS |
|---------------------------------------|--|--|
| The Organization | Focused on the boss Follow the rules Closed Orientated to organization chart Waiting for orders Rigid | Focused on the customer Live the values Open Orientated to processes that create value Taking responsibility Evolving |
| Senior Management Role | Tactical focus Manage conflicts with unions Emphasis on tasks | Strategic focus Partner with unions on common interests Emphasis on people and culture |
| Mid-Management and Supervisor Role | Manage your own department or group Enforce the rules Maintain performance | Team-manage the work of groups as processes Coach, mentor, and support Implement improvements |
| Front-line Associate Role | Do what you are told | Manage own work Suggest and make improvements |

Along the way, the organization learns how to change, improve, and evolve continuously. It does this by focusing on people first — in particular, on passengers, employees, and people in the community. Systems, procedures, structure, measures, and responsibilities are transformed to support the employee's desire to serve the passenger and the community. You can't implement TQM by rigidly following a recipe. Your organization and situation will have unique elements, and you must modify existing approaches or develop new ones to fit your needs.



Evaluation and improvement of the quality process

For the customer, service quality is everything. Approaches in the past that entailed (even opposing) one particular aspect of service quality to another – punctuality, safety, customer service – overlooked this basic overall customer expectation. In the public transport sphere like any other, quality has to take account of service's every dimension [2].

A quality approach cannot be implemented without knowing the quality expected by the customers; not the utopian quality that might dream outside the specific context, nor contrarily the quality that expect to encounter objectively during the next journey, but the service that customers see as legitimate and normal [10]. The expression of this expected quality means that all the stakeholders have to view the services through customer's eyes [11]. According to given reasoning the quality of public transport service should be viewed from diverse aspects considering population's needs and possibilities country.

First should be discussed main functions of public transport and requirements to it dividing them according to the importance to customers, environment and community [8; 9].

| Table 2 | |
|----------------------------|------------|
| The Public Transport Quali | ity Matrix |

| 1. CUSTOMER | 1.1.Time | 1.6 Comfort |
|--------------|----------------------------------|-----------------------------|
| REQUIREMENTS | 1.1.1 Length of travel time | 1.6.1 Ambient conditions |
| | 1.1.2 Punctuality | a) air quality and |
| | 1.1.3 Frequency | temperature |
| | 1.1.4 Operating ours | b) weather protection |
| | 1.1.5 Reliability | c) cleanliness |
| | | d) congestion |
| | 1.2 Availability | e) noise, vibration |
| | 1.2.1 Distance to boarding | |
| | points | |
| | 1.2.2 Need for transfers | 1.6.2 Facilities |
| | 1.2.3 Area covered | a) seating and personal |
| | | space |
| | 1.3 Affordability | b) toilets/washing |
| | 1.3.1 Price | c) luggage |
| | 1.3.2 Concessionary tariff | d) refreshments |
| | 1.3.3 Different types of tickets | e) entertainment |
| | | 1.6.3 Ergonomics |
| | 1.4 Information | a) easy of movement |
| | 1.4.1 Understandability | b) furniture design |
| | 1.4.2 Comprehensiveness | 1.6.4 Ride comfort |
| | 1.4.3 Easy access, visibility | 1.7 Security |
| | | 1.71 Safety from crime |
| | 1.5 Customer care | 1.7.2 Safety from accidents |
| | 1.5.1 Commitment | |
| | 1.5.2 Flexibility | |
| | 1.5.3 Staff assistance / | |
| | Empathy | [|



| Table | 2 | Cont. |
|-------|---|-------|
| | _ | ~~~ |

| 2. COMMUNITY REQUIREMENTS | 2.1 Optimal routs 2.2 Good legislative structure 2.3 Absence of transport jams/congestion 2.4 Competitiveness | 2.5 Smooth management system 2.6 Efficient control 2.7 Low capital expenditure 2.8 Low maintenance costs 2.9 Covered network |
|----------------------------------|--|--|
| 3. ENVIRONMENTAL REQUIREMENTS | 3.1 Pollution 3.1.1 emissions 3.1.2 noise 31.3 visual pollution 3.1.4 vibration 3.1.5 dust & dirt 3.1.6 odour 3.1.7 waste | 3.2 Infrastructure 3.2.1 effect of vibration 3.2.2 wear on road 3.2.3 disruption |

The organization should evaluate the TQM process itself and improve it on a regular basis. Normally, the evaluation should be done once a year and coordinated with other significant planning functions, e.g., the annual budgeting process. Major steps to evaluate quality process include:

- Determining the areas for the evaluation and assessment method
- Conducting the quality assessment
- Identifying quality process improvement opportunities

During the foundation phase, it may be more appropriate to use fairly elementary areas of evaluation. After the quality process has established sufficient momentum, it may be more productive to do a more comprehensive and rigorous evaluation using, for example, the Malcolm Baldrige National Quality Award criteria.

Assessment methods range from informal self-assessments to formal third-party audits based on extensive documentation and review. Generally speaking, it's best to use an objective auditor or audit team skilled and experienced in both the use of quality assessments and the transit industry. Employee focus groups are often helpful for gaining insight into the effectiveness of various TQM initiatives and the overall cultural impact of the TQM process.

Elementary evaluation areas for a quality process are:

1. Customer Focus: To what extent does the organization see:

- Customer satisfaction input, measurement, and priority identification.
- Improvement efforts targeted to improve customer service and satisfaction.
- Customer satisfaction integrated into organizational objectives and accountability.



- 2. Employee Participation and Development: To what extent does the organization have:
 - Employee involvement in improvement.
 - Employee empowerment and involvement in decision-making.
 - Employee development, training, and support.
 - Employee recognition for quality improvement.
- 3. System for Continuous Improvement: To what extent does the organization have:
 - Processes for improvement opportunity identification and selection.
 - Processes for improvement opportunity analysis and implementation.
 - Use of objectives, measurement, and evaluation.
 - Process as well as project orientation.

4. Leadership: To what extent does the organization see:

- Senior-management involvement in creating and reinforcing customer focus and quality principles, including communications processes.
- Middle-management and supervisor involvement in supporting customer focus and quality principles.
- Labor-management teamwork.
- Overall culture change momentum.

There are two samples (tables 2 and 3) of customer and employ surveys the results of which can be used to evaluate and improve the organization's quality process.

Table 2

Customer Report Card

PLEASE EVALUATE OUR SERVICE BY MARKING THE APPROPRIATE BOX.

| BUS OR VAN | Outstanding | Pleased | Satisfactory | Falls | Needs |
|------------------------------|-------------|----------|--------------|----------|-------|
| | | | | Snort | нер |
| 1. Cleanliness Inside | ↑ | ↑ | ↑ | 1 | 1 |
| 2. Cleanliness Outside | 1 | ↑ | 1 | 1 | † |
| 3. Availability of Seats | 1 | ↑ | 1 | 1 | 1 |
| 4. Dependable Equipment | 1 | 1 | 1 | 1 | 1 |
| 5. Heating/ Cooling | 1 | ↑ | 1 | ↑ | 1 |
| 6. Comfort | 1 | ↑ | 1 | Ť | 1 |
| 7.DestinatioSign Information | 1 | 1 | 1 | 1 | 1 |
| DRIVER | | | | | |
| 8. Courteous | 1 | ↑ | 1 | ↑ | 1 |
| 9. Appearance | 1 | 1 | 1 | 1 | 1 |
| 10. Attitude | 1 | ↑ | 1 | ↑ | 1 |
| 11. Helpfulness | 1 | 1 | 1 | 1 | 1 |
| 12. Driving Skills | 1 | 1 | ↑ | † | † |



Table 2 Cont.RELIABILITYANDSERVICE

| 13. On Time Performance | 1 | 1 | 1 | 1 | 1 |
|-----------------------------|---|----------|---|----------|---|
| 14. Time Between Buses/ | 1 | 1 | 1 | 1 | 1 |
| Vans | | | | | |
| 15. Hours/ Days of Service | 1 | ↑ | 1 | Ť | 1 |
| 16. Length/ Directness of | 1 | 1 | 1 | 1 | 1 |
| Ride | | | | | |
| 17. Feeling of Safety While | 1 | ↑ | 1 | 1 | 1 |
| Riding | | | | | |
| 18. Ease of Fare Payment | 1 | 1 | 1 | ↑ | 1 |
| 19. Ability to Transfer on | 1 | 1 | 1 | 1 | 1 |
| Time | | | | | |

| FACILITIES | | | | | | | |
|---------------------------|---|----------|---|---|----------|--|--|
| 20.Cleanliness | 1 | 1 | 1 | 1 | 1 | | |
| 21. Location | 1 | 1 | 1 | 1 | 1 | | |
| 22. Signs and Information | 1 | ↑ | 1 | 1 | ↑ | | |
| 23. Safety/ Security | 1 | 1 | 1 | 1 | 1 | | |

| OTHER CUSTOMER SERVICES | | | | | |
|---|---|---|---|---|----------|
| 24. Clear/ Understandable | 1 | 1 | 1 | 1 | 1 |
| Information | | | | | |
| 25. Accuracy of Information | 1 | Ť | 1 | Ť | Ť |
| 26. Handling of Complaints | 1 | Ť | 1 | Ť | ↑ |
| 27. Understandable/ Usable \uparrow \uparrow \uparrow \uparrow \uparrow | | | | | 1 |
| Printed Schedules | | | | | |

Table 3

Employee Survey

| Your Opinions. Indicate how much you | Stron | Agre | Some | Somew | Disagr | Strongl |
|--|-------|------|-------|---------|--------|---------|
| agree with the following statements by | gly | e | whatA | hat | ee | У |
| checking the appropriate box. | Agre | | gree | Disagre | | Disagre |
| | e | | | e | | e |
| 1. Most of our passengers would say this | 1 | 1 | 1 | 1 | 1 | 1 |
| organization produces high quality | | | | | | |
| service. | | | | | | |
| 2. This organization understands what | 1 | 1 | 1 | 1 | 1 | 1 |
| passengers want. | | | | | | |
| 3. Most employees I know are satisfied | 1 | 1 | 1 | 1 | 1 | 1 |
| with their job. | | | | | | |



Table 3 Cont

| 4. Management understands the problems | 1 | 1 | 1 | 1 | 1 | 1 |
|---|---|---|---|---|---|----------|
| front-line employees face on the job. | | | | | | |
| 5. This organization is highly regarded by | 1 | 1 | 1 | 1 | 1 | ↑ |
| the general public. | | | | | | |
| 6. This organization uses information from | 1 | 1 | 1 | 1 | 1 | 1 |
| passengers to make improvements. | | | | | | |
| 7. I would recommend this organization to | 1 | 1 | 1 | 1 | 1 | 1 |
| a friend as a good place to work. | | | | | | |
| 8. This organization's commitment to | 1 | 1 | 1 | 1 | 1 | 1 |
| passenger satisfaction is obvious in what | | | | | | |
| we do on a daily basis. | | | | | | |
| 9. This organization looks for the causes | 1 | 1 | 1 | 1 | 1 | 1 |
| of problems rather than blaming people. | | | | | | |
| 10. Labor-management cooperation is | 1 | 1 | 1 | 1 | 1 | Î |
| good at this organization. | | | | | | |
| 11. This organization uses information | 1 | 1 | 1 | 1 | 1 | 1 |
| from employees to make improvements. | | | | | | |
| 12. This organization is working hard to | 1 | 1 | 1 | 1 | 1 | 1 |
| eliminate some of the problems faced by | | | | | | |
| front-line employees. | | | | | | |
| 13. This organization supports me when a | 1 | 1 | 1 | 1 | 1 | Î |
| conflict arises while I'm doing my job. | | | | | | |
| 14. This organization provides adequate | 1 | 1 | 1 | 1 | 1 | Î |
| and appropriate training. | | | | | | |
| 15. I have resources to do my job well. | 1 | 1 | 1 | 1 | 1 | Î |
| 16. This organization often consults with | 1 | 1 | 1 | 1 | 1 | Î |
| front-line employees to determine the | | | | | | |
| causes and possible solutions for | | | | | | |
| problems. | • | | | | | |
| 17. Employees are treated with respect in | Î | Î | 1 | Î | 1 | Î |
| this organization. | • | | | | | |
| 18. This organization takes action to | Î | Î | 1 | Î | 1 | Î |
| improve passenger satisfaction. | • | | | | | |
| 19. There is good cooperation between my | Î | Î | 1 | Î | 1 | Î |
| group and other groups in this | | | | | | |
| organization. | • | | | | | |
| 20. This organization makes good use of | Î | Î | 1 | Î | 1 | Î |
| teamwork to solve problems. | • | | | | | |
| 21. This organization recognizes | Ť | Ť | T | Ţ | T | Ţ |
| employees who do a good job. | | | | | | • |
| 22. This organization is constantly looking | Ť | Ť | T | Ţ | T | Ţ |
| for better ways of doing things. | | | | | | |



Table 3 Cont.

| 23. I have the authority I need to do my job well. | Ţ | Ţ | † | Ţ | † | 1 |
|---|----------|---|---|---|---|---|
| 24. This organization is establishing a climate where employees can challenge our traditional ways of doing things. | ↑ | ţ | ↑ | Ţ | ↑ | Ţ |
| 25. Overall, I think this organization is changing for the better. | 1 | Î | 1 | † | 1 | † |

Conclusions

The transit industry faces many of the same challenges as other 21st-century businesses. Service quality and innovation is crucial in transforming the image of public transport: firstly, because a positive image encourages people to use public transport; secondly, because it justifies to decision-makers and taxpayers alike the funding efforts demanded of the community in favour of public transport and that condition its development. The principles of TQM appear to hold promise as a way to improve transit service, increase ridership, and fulfill the transit industry's broad social mission together with sustainable development of transport system. Transit agencies need guidance on and methods for implementing TQM in the public transportation environment. Successful improvement actions are great means in achieving organization's development. It can ensure that organization's performance have a good chance for success by carefully focusing them on specific problems or opportunities. Successful and attractive public transport can be a great factor in solving excessive car traffic and its negative impact as well as be a great promoter in pursue of sustainable mobility.

REFERENCES:

- 1. European quality promotion policy for improving European competitiveness, European Commission DG III; Industry, 1999.
- 2. Benchmarking the competitiveness of European industry, Commission communication, COM 9960463.
- 3. The Citizen's Network Fulfilling the potential of public passenger transport in Europe. European Commission, Green Paper, ISBN 92-827-5812-5, 1996.
- 4. The European way to Excellence, European Commission DG III; Industry, 2004.
- 5. http://europa.eu.int/comm/energy_transport/etif/index.html
- 6. http://europa.eu.int/comm/transport/extra/policy_brochures.html
- 7. Viegas, J. M. Public transport in the sustainable urban transport policy package: taking an integral policy approach. ECMT/OECD Workshop on implementing strategies to improve public transport for sustainable urban travel. Athens, Greece, 1999.
- 8. Kennedy, C. A. A comparison of the sustainability of public transport and private transport systems. Transportation, 29 (4), 2002, p. 459-493.
- 9. UITP, International Association of Public Transport, A UITP position paper, http://www.uitp.com.
- 10. Hußmann, H. The Bus Transit System and its Contribution to Promoting Mobility and Quality of Life. Public transport '95. 51st International Congress Paris 1995.



11. Richard, M. Quality and customer's satisfaction. 52 nd International Congress, Stuttgart 1997.



ACHIEVING GREEN PRODUCTION VIA INTEGRATING MANAGEMENT SYSTEMS

Salek Zamani MARYAM¹, Salek Zamani ALI², Salek Zamani YAGHOUB³

1.Standard Expert of East Azarbaijan Standard and Industrial Research Institue, 2.Expert of East Azarbaijan Agriculture and Natural Resources Research Center 3.Assistant Professor of Tabriz Medial Sciences University slkzmn@yahoo.com

Products (goods and services) are the major cause of the environmental pollution and the depletion of resources. All products have impacts on the environment which differ in magnitude and nature, and this may occur at any stages of the product's life cycle.

International management systems in the areas such as environment, quality, social responsibility, occupational health and safety are vital for ensuring that our products and management systems meet environment, health and safety requirements. Integrating of these standards increases their effectiveness and efficiency. This article intends to clarify the benefits and ways of such integration for the creation products by using processes and systems that are non –polluting, help conserve natural recourses and energy and safety.

Introduction:

The way people do business around the world is changing by environmental concerns, growing public pressure and regulatory criteria. **Environmentally** – **friendly** products (goods and services) are increasingly sought by consumers and shareholders. The most important aim for socially responsible organizations is to demonstrate that not only their philosophy but also their day – to – day operations are in the direction of green production. They strive for customer satisfaction as well as contributing in sustainable development by achieving high" environmental quality" in their products, and activities.

An integrated management system which combines the management systems ISO 9001 for quality, ISO 14001 for environment, and OHSAS 18001 for occupational health and safety is officially recognized as being an effective management system for addressing the relation of production to development and the environment (green production).

Importance of Integrated Management Systems

Designing and operating processes and developing and producing products becomes more effective by means of using Integrated Management systems (IMS). The costs of waste and emissions, including negative environmental and health impacts can be avoided or minimized by applying IMS, throughout the entire production cycle.



IMS integrates all formalized systems focusing on environment, health, quality, personnel, finance... encourages uniformity and consistency of key activities (prevents duplicate work), and helps to focus management priorities and strategies. IMS makes it possible for organizations to manage productivity and at the same time increasing profits without causing damage to the environment, improve performance and operational efficiencies, reduce risk and liabilities and gaining better public image.

Description of integrated management system's structure

Every organization should base its integrated system on its own processes and align it with its own policy and objectives. The ISO 9001 and ISO 14001 standards and OHSAS 18001 are compatible and have common principles and approaches. Two distinct principles " Deming cycle" ,which describes the sequential steps of Plan-Do-Check-Act (PDCA) that are directed at achieving objectives in a gradually more effective and efficient manner, and "The Process Approach" ,which refers to the systematic identification and management of processes within an organization and their interrelation and interactions, make it possible for organizations to adopt a proper manner for integrating their applicable management system standards into one management document, identify their objectives and obligations, addressing all input requirements at all appropriate locations, determining performance criteria, monitoring and reporting the extent of compliance with those criteria and ensuring that there is a process for continually improving their system.

Conclusion

There is no doubt that the integration the different parts of overall systems of organization is the key issue for the organizations which aim to manage their activities effectively for delivering environmentally – friendly products or in other words achieving green production.

The major cause of the continued deterioration of the global environment is the unsustainable pattern of production. It is better, and usually much less expensive to prevent environmental problems from happening than to fix them once they are created. By integrating management systems it becomes possible to reduce risks to humans and the environment, conserving raw materials and energy, reducing emissions and waste.

Green production demands a conceptual and procedural approach in which all phases of the life-cycle of products is being addressed with the objective of the prevention or minimization of short and long term risks to humans and the environment, and this becomes practical by integrating management systems.


FOR INCREASING ENVIRONMENTAL SUSTAINABILITY ECO LABELLING AND IMPLEMENTATION IN TURKEY

¹Reha SAYDAN, ²Sima NART,

¹Faculty of Economics and Administrative Sciences, Department of Business Administration Yuzuncu Yıl University, Van-Turkey
²Faculty of Economics and Administrative Sciences, Department of Business Administration, Bandirma, Balikesir University, Balikesir-Turkey rsaydan@hotmail.com

The importance of the subjects related to environment had increased a lot for both producers and consumers since the beginning of early 1980s and legal arrangements regarding environmental issues had been made and put into effect in all industrialized countries seriously. As a result of the consumer's behaviours and their ideas on the product's characteristics as not only being unsatisfactory but really dangerous in some cases, the consumers started to examine the products more carefully with respect to their effects on themselves in the first place and then their effects also on the environment⁹.

Social changes in this direction brought the legal arrangements towards protection of the consumers and the environment together. This sensitivity on environmental issues getting stronger in industrialized countries is affecting the products subject to the international trade as well as the other companies exporting to these countries. For this reason, many countries started the application of green label in order to meet this requirement and guide the consumers in making selection.¹⁰.

Increasing environmental sensitivity in the European Union countries being in the position of the most important market in Turkey's exports, the manufacturing of products that are environmental and consumer friendly and, most important of all, harmless to human health has gained a considerable importance in those countries. There are many labels that were developed in the European Union countries and gained an international acceptance afterwards; and these labels are generally accepted in one or more countries. Some of them are Blue Angel, SG, Öko-teks, WWF Panda labels in Germany, Falcon and Krav labels in Sweden, Millieukeur and Eko labels in The Netherlands, NF label in France and SWAN label in Sweden, Norway, Finland and Iceland.

Eco label means the use of the label on a product to inform the consumers that it is more environmental friendly among the ones in the same category. The aim of eco-label is to affect the consumers and product designer towards the development of better products and technologies in environmental point of view.¹¹

⁹ Art Kleiner, "What Does It Mean To Be Green", Harvard Business Review, July/Aug. 1991, p. 39

¹⁰ Jim Salzman, "Green Labels For Consumers", The OECD Observer, Apr/May 1991. p.29

¹¹ Ercan Gegez, at al, **Uluslararası Pazarlama Çevresi**, Der yayınları, İstanbul: 2003, p. 204



As a result of development and common usage of the ecological product labels in more than one countries, studies had been started for developing an environmental label that will be available in all EU countries (eco label) and EU Environmental Label had been established in March 23rd 1992 by European Council's Directive No. 880. Environmental friendly products are being awarded by an environmental label in the context of this system.

In this study, therefore, we tried to focus on Eco Label which aim is to promote products with a reduced environmental impact and create environmental quality also give a picture on its progress in the world and Implementation in Turkey.

1. From Consumerism And Environmentalism To The Green Products

Much of pressure for social responsibility by businesses comes from their customers, the consumer movement (consumerism) surfaced in the 1960's to protest unethical pricing, dangerous product, and deceptive advertising. The past decade has seen an increase in consumerism and the rise of consumer groups with more cause-oriented single issues.

Consumerism consist of all the activities undertaken by independent individuals, groups and organization to protect their rights as consumers¹². Consumerism is a struggle for power between buyers and sellers. Specifically, it is a social movement seeking to increase the rights and powers of buyers in relation to sellers¹³.

Still environmentalism is not against marketing consumption, they simply want people and organizations to operate with more care for the environment. The marketing system's goal should not be to maximize consumption, consumer, choice or consumer satisfaction but rather to maximize life quality. And life quality means not only quantity of consumer goods and service, but also the quality of the environment¹⁴.

These changing consumer attitudes have sparked a major new marketing thrust -Green Marketing- the rush by companies to developed and market "environmentally friendly" products. Green marketing began in the early 1980s in Europe with the sale of green products- new types of disposable diapers, detergents, bataries, aerosols and other products, that don't damage the environment

¹² Steven J. Skinner, **Marketing**, Houghton Mifflin Company, Boston, p. 673.

¹³ Tom Kinnear, at all, **Principles of Marketing**, Harper Collins Collage Publishers, 1994, p. 49

¹⁴ Philip Kotler, Gary Armstrong, **Principles Of Marketing**, *Printice* Hall Englewood Cliffs, New Jarsey, 1993, p. 530



The producers had to solve three important subjects with respect to their products as the environmental movement getting more and more developed: ¹⁵

1: Rational Packaging: Using less packaging materials and preferring re-cycling containers in packaging their products

2: Life Curve Analysis: It is an analysis for specifying the total environmental risks of a product covering the whole manufacturing, usage and wasting periods.

3: Health and Safety: Manufacturing of the products that are friendly to the consumers and the environment.

Today's consumers expect the manufacturers to act in a more sensitive way against environmental issues anymore and also expect the manufacturers and the countries they are living in to be aware of their responsibilities and to put applications into effect for protection of the environment..

Therefore Many firm becoming environmentally sensitive, for example the Duracell and Everyready batteries and will eventually market mercury-free product. Sanyo sells its rechargeable batteries in a plastic tube that can be ailed back. The company then recycles both the tubes and the cadmium batteries¹⁶. Turtle Wax car-wash products and detergents are biodegradable and can be digested by waste treatment plants and its spray products do not use propellants that damage the ozone layer in the earth's upper atmosphere¹⁷. Similarly L'eggs redesigned its trademark plastic egg package and replaced it with a more environmentaly friendly cardboard package¹⁸ General Motors, Ford and Chrysler joined 14 oil companies to form the Auto/Oil Quality Improvement Research Program to search for new gasoline formulas¹⁹.

As a result of consumerism and environmentalism for which we had given some examples above, some of the products that are friendly to environment and consumer are as follows:

Products in glass containers, textile products produced by using dyes that are friendly to human health and environment, ecological agricultural products, non-acid shampoo, refrigerators not containing CHF, condensed and re-cycling package detergents, unleaded gas, deodorants not destroying the ozone layer, toilet papers disappearing in nature, environmental friendly computers, non-radiant computer screens, electrical home appliances with less electricity consumption, bulbs, dyes not containing dangerous materials, environment friendly shoes, and many other products like these.

¹⁵ Jacqueline S. Scerbinski, "Consumer and the Environment: A Focus on Five Products" Journal of Business Strategey, Sept/Oct. 1991, p. 47.

¹⁶ Terry Lefton, "Beating the Green Rap", Adweek's Marketing Week, 27 January, 1992, p. 6.

¹⁷ Jeo Schwartz, "Turtle Wax Shines Water Too" American Demographics, April, 1992, p.14.

¹⁸ Marketing News, L'eggs to Scrap Plastic ",*egg package*" 19 August 1991, p.20.

¹⁹ Business Week "Bib Oil Sees The Future- And It's Clean Gasoline" April, 8, 1991, p. 60.



2.The Eu Eco-Label (Flower)

The Eco-label was initially created in 1992, by Regulation 880/92/EEC, which has been reviewed recently by the European Parliament and Council Regulation (EC) No 1980/2000 of 17 July 2000 on a revised Community eco-label award scheme. This system distinguishes environmentally-friendly products and is a part of a wider strategy aiming to promote sustainable development in the production and consuming sectors. The same Flower logo is used across different product groups and Member States, making it easier to recognize products with a superior environmental performance²⁰. It helps consumers to use their purchasing power to buy from companies that respect the environment. The flower is the only true eco-label valid throughout the 25 EU Member States plus Iceland, Liechtenstein and Norway.

It is already found on hundreds of products in a wide range of categories Also, the EU's new integrated product policy (IPP) aims to help industry to reduce waste through better product design, making goods longer lasting and easier to recycle or recondition, and to expand the market for green products. Companies are realising that adopting cleaner technologies makes sense both in cutting costs, and in promoting a better image and winning customers and clients. The EU's aim is to expand this environmental awareness, The system gives consumers the opportunity to identify ecologically friendly products²¹. (from the flower logo)

Eco label products, refers to the marketing of products and packages that are less toxic than normal, are more durable, contain reusable materials, or are made of recyclable materials. In short, these are products considered environmentally friendly and their marketers are "environmentally responsible". And The consumers union believes that eco labels should be; Clear, they should have well-defined standards that are meaningful and verifiable and that support the label.

A detergent formulated to be biodegradable and not to pollute would be judged friendlier than a detergent whose formulation would be harmful when discharged. Aerosol propellants that do not deplete the ozone layer are another example of environmentally friendly products.²² It is a market-based voluntary instrument that has as a major twofold purpose:

- 1. To promote the design, production, marketing and use of consumer products and services that have a reduced environmental impact during their entire life-cycle, and
- 2. To provide consumers with better information on the environmental quality of products and services, to help them make informed environmental choices in their purchases. Products that meet strict ecological and performance criteria are awarded with the Flower logo. This logo can be displayed as a marketing tool to show consumers that product has a superior environmental performance.

²⁰ Business Europe "*Packaging Problems*", June 5, 1996, p.1.

²¹ The European Union And The Environment, Directorate-General For Press And

Communication Publications "Choicies For A Greener Future", Belgium, p. 18.

²² Ira Teinowtz "U.S. Government Fights EU on Ecolabel Awards", Ad Age International May 9, 1997, p.30.



And also the main elements of scheme 23 .

- **1.** It is selective: because it is awarded only to those products with the lowest environmental impact.
- 2. It is transparent: the ecological criteria that products must meet are developed with the input of relevant stakeholders such as industry, commerce, environmental and consumer organizations and trade unions. Furthermore, consumers can be sure that a product/service that displays the Flower logo has been awarded it by an independent authority with no vested Interest in the company.
- **3.** It works with a multi-criteria approach: the whole life cycle of the product/service is analysed in order to study all its potential environmental impacts.
- **4.** It has a European dimension: Eco-labeled products can be marketed across the 15 Member States, as well as Norway, Iceland and Liechtenstein. Some producers from accession countries have already been awarded the Flower logo.
- 5. It is voluntary: hence it does not create barriers to trade.

2.1. Product Groups Criteria and Manufacturer

The program started 1992, eco labels have been issued for only four sectors-washing machines, dishwashers, tissue paper products and soil improvers - and only a handful of companies have applied for labels²⁴. The Eco-label scheme is open to manufacturers and importers of consumer goods, with the exception of food products, beverages and medicine

From 1993 up to now There are currently 21 product categories and already more than 300 licences have been awarded for several hundred products which can receive this award, ranging from all purpose & Sanitary cleaners" Bed mattresses" Copying paper" Dishwashers" Dishwashing detergents" Footwear" Hand dishwashing detergents" Hard floor coverings" Indoor paints & varnishes" Laundry detergents" Lightbulbs" Refrigerators" Soil Improvers" Textile products" Tissue paper" Tourist Accommodation" Vacuum cleaners" Washing machines, Television, etc,²⁵.

For a product to be awarded with the environmental label at EU level within the system that is being established, the definition of the product and the environmental criteria must be specified. All the phases from selection of raw materials to the production, distribution, consumption and re-cycling properties after its usage are taken as the bases in specification of these criteria²⁶.

²³ http://kommanet.nl/greenbus

²⁴Roberts Michael, "Chemical Week", Vol. 156, Issue 18, 1995, p.20.

²⁵ www.defra.gov.uk

²⁶Özden Ergün, "Eco Label", IGEME Dergisi, 1999, p. 4.



Table: 1 The General Description Some Of The Product Groups

| WASHING | DISWASHER | VACUM | LAUNDRY | REFRÍGERA |
|------------------|-----------------|-----------------|------------------|------------------|
| MACHINE | | CLEANER | DETERGENT | TORS |
| | | | S | |
| The product | The product | Environmental | The product has | The product |
| consumes less | consumes less | damage related | a reduced | consumes less |
| energy | energy | to the use of | impact on the | energy |
| (electricity | | energy and | aquatic | (electricity |
| consumption is | | natural | environment | consumption is |
| reduced by | | resources is | | reduced by |
| approximately | | reduced | | approximately |
| 50%) | | | | 60%) |
| The product | Water | Recyclability | It does not | The product |
| guarantees a | consumption is | durability and | contain certain | guarantees high |
| high level of | significantly | maintainability | dangerous | level |
| performance | reduced | | substances | performance |
| (Class A or B) | | | | |
| when washing | | | | |
| or spin drying | | | | |
| | | | | |
| Water | Noise level are | The product | It has a limited | Noise level are |
| consumption is | reduced | carries | effect on the | reduced |
| reduced by | | instructions on | growth of algae | |
| approximately | | how to achieve | in water | |
| 40% | | the best | | |
| | | environmental | | |
| | | use | | |
| Noise levels are | The product | The use of | It is largely | it can be easily |
| reduced | offers energy | hazardous | biodegradable | dismantled and |
| | saving washing | substances is | | recycled |
| | | reduced | | |



Table 1 Cont

| The product contains less substances that are dangerous for the environment and health | The product guarantees high level performance | It uses less packaging | The availability of spare parts is guaranteed for twelve years after production ceases |
|--|--|--|---|
| The products can be taken back free of charge by the manufacturer after use It can be easily dismantled and recycled | it can be easily dismantled and recycled | It contains information on how to wash ecologically and economically | The use of substances with a global warming or ozone depleting effect is minimized The availability of spare parts is guaranteed for twelve years after production ceases |
| | | | The product can be taken back free of charge by the manufacturer after use |

Source: www.ecolabel.com

2.2. Application

All the competent authorities had been specified within the EU countries for the application of EU environmental labels that may be requested by the producers and importers in the EU as well as non-EU producers with regard to the aforementioned product groups. This Application must be made to the competent authority of the country at which the product is first presented to the market or to the authority of the country it is imported. Environmental label that is received by applying to the authorities of a EU country will be valid also in all the EU countries. In case a competent authority approves an application, it transmits that information to the EU commission. The commission has to inform this to all other competent authorities. In case there are no counter-arguments from other authorities within a period of 30 days following its notification, the label will be granted and that label will be available in all the EU countries as well as the other countries putting their signatures on the European Economical Area Agreement (Norway, Iceland, Lichtenstein, etc.).



2.3. Entering Fee and Validity

In case there will an application for a EU environmental label, an application fee of EUR 300 – 1,300 is paid to the competent authority accepting that application; and, after granting the EU environmental label, another fee of EUR 500 - 25,000 has to be paid on an annual basis. There is a discount of 25% made to the developing countries for the application and usage fees. The company that was granted an environmental label is in the position of paying a certain percentage of its annual sales volume. Competent authorities may claim a 20% higher of lower than this value that is defined as 015% in the beginning²⁷.

| | Minimum | Maximum | Reductions (1) |
|--|-------------|-------------------|---|
| Applicationfeecovers the costs ofprocessingtheapplication. | EUR 300 | EUR 1300 | 25% for SMEs and applicants from developing countries |
| | Minimum | Maximum | Reductions (2) |
| Annual fee | EUR 500 | EUR 25000 | 25% for SMEs and |
| for the use of the | Per product | Per product group | applicants from developing |
| label | group per | per applicant. | countries |
| : 0.15% of annual | applicant | | 15% for companies |
| volume of sales of | | | registered under EMAS or |
| the product within | | | certified under ISO 14001 |
| the Community | | | Other reductions possible,. |

Table:2 The New Eco-label Fee Structure

Sources: www. Ecolabel.com.

In case it is applied to any competent authorities for a EU environmental label, that authority requests some information to determine the conformance of the product group in question to the ecological criteria, and informs which tests has to be made while informing also the contents of these tests.

The validity period of the EU environmental label depends on the validity period of the specified environmental criteria. In case the environmental criteria regarding the product(s) in question expires, all the agreements signed for granting of the EU environmental label for this product group will be terminated.

Product group criteria are usually valid for a period of 3-5 years according to the Commission Decision on the relevant product group. Ecological criteria are reviewed before they expire and may be revised. If criteria have been revised will have to renew contract. If criteria have been prolonged contract is automatically renewed, as long as the criteria remain valid. You may use the eco-label from the date it is awarded until the end of the period of the validity of the criteria.

As we mentioned before, European environmental label (eco-label) had been granted to 182 producers producing 21 groups of products. The following table shows these countries and

²⁷ www. defra.gov.uk



product groups. As it is understood from the table, the most awarded ones among others are the textile products; while varnish, dyes and other cleaning products follow that product group. If we look at the table with respect to the countries, Italy is heading the EU countries with its 49 eco-labels. France and Denmark is following Italy with 35 and 31 products respectively.

| | BE | DK | DE | EL | ES | FR | IE | IT | LX | NL | PT | UK | AT | SE | FI | NO | IC E | LI E | TO T |
|---------------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------|---------|---------|
| Washing machines | | | | | | | | | | | | | | | | | | | 0 |
| Dishwashers | | | | 1 | | | | | | | | | | | | | | | 1 |
| Refrigerators | | 1 | | | | | | | | | | 1 | | | | | | | 2 |
| Paints/ varnishes | | 3 | 1 | 5 | 5 | 10 | | 3 | | | 3 | | | 7 | 1 | | | | 38 |
| Soil improvers | 1 | | | | 1 | 11 | | 1 | | | | | | | | | | | 14 |
| Tissue paper | | | 2 | | | 1 | | 6 | | | | 1 | | | | | | | 10 |
| Copying paper | | | | | | | | 2 | | | | | | | | | | | 2 |
| Dishwashing Detergents | | 1 | | | | | | 5 | | 1 | | | | 1 | | | | | 8 |
| Laundry detergents | | 1 | | | | | | 5 | | 1 | | | | | | | | | 7 |
| Lightbulbs | | 1 | | | | | | | | | | | | | | | | | 1 |
| Textile products | 1 | 19 | 1 | 1 | 5 | 9 | | 7 | | 1 | 1 | 1 | 1 | 5 | | 1 | | | 53 |
| Footwear | | 1 | | | | | | 6 | | | | | | | | | | | 7 |
| Bed Mattress | | 1 | | 4 | 1 | | | | | | | | | | | | | | 6 |
| Personal Computers | | | | | | | | | | | | | | | | | | | 0 |
| Portable Computers | | | | | | | | | | | | | | | | | | | 0 |
| All-purpose & sanitary cleaners | | 3 | | | 2 | 2 | | 5 | | 1 | | | 3 | | | | | | 16 |
| Hand dishwashing detergents | | | | | | 2 | | 7 | | 1 | | | | | | | | | 10 |
| Televisions | | | | | | | | | | | | | | | | | | | 0 |

TABLE: 3 Groups of Product And Producer Countries



Table 3 Cont.

| HardFloor | | | | | 1 | | | 2 | | | | | | | | | | | 3 |
|--------------|---|----|---|----|----|----|---|----|---|---|---|---|---|----|---|---|---|---|-----|
| Coverings | | | | | | | | | | | | | | | | | | | |
| Tourist | | | | 1 | | | | | | | | | 1 | | | 2 | | | 4 |
| Accommoda | | | | | | | | | | | | | | | | | | | |
| tion Service | | | | | | | | | | | | | | | | | | | |
| Vacuum | | | | | | | | | | | | | | | | | | | 0 |
| Cleaners | | | | | | | | | | | | | | | | | | | |
| Total | 2 | 31 | 4 | 12 | 15 | 35 | 0 | 49 | 0 | 5 | 4 | 3 | 5 | 13 | 1 | 3 | 0 | 0 | 182 |

Source: www.eco-label.com

Competent Body Codes: AT: Austria, BE: Belgium, E: Germany, DK: Denmark, EL: Greece, ES: Spain, ES-CAT: Catalonia, Spain, FI: Finland, FR: France, IE: Ireland, IT: Italy, NL: The Netherlands, NOR: Norway, PT : Portugal, SE : Sweden, UK: United Kingdom

Figure 1







3. Present Situation in Turkey

As a result of developments lived with respect to the ecological products, there had been a lot of developments also in Turkey especially in the field of textile industry which has the most important share in the country's exports. One of these developments is the establishment of Eco-tex Laboratory as financed by The Foundation of the Union of Istanbul Ready-made Goods and Confection Importers. This laboratory that was established with the aim of making the tests required by our textile exporters at the shortest possible time and according to the standards available at the level of the developed countries, will also conduct all kinds of research and development activities. The laboratory that was established with an investment of about 5 million US dollars is capable of making all textile tests.

On the other hand, the Institute of Textile Training and Confection Clean Technologies (TTKTTE) had been established with the aim of establishing a laboratory network in textile industry and transmitting information to the sector on clean technologies.

A special laboratory belonging to Hohenstein Institute had been established in Istanbul regarding the labels of special ecological products and giving Öko-Tex 100 labels. Eco-Tex: Nowadays in Europe many private environmental labels are been used. The one used widespread in the textile field is the "Eco-Tex 100".

In 1994, Austria Textile Research Institude (ÖTİ) and Honenstein Research Institude (FIH) incorporated under "International Association for Research and Testing in the Field of Textile Ecology" (briefly Eco-Tex) and constituted a textile label named as "Eko-Tex Standard 100". The label in question informs the consumers that the product does not give any harm to human health and to environment²⁸.

Some of our companies had already received some special environmental labels accepted in the EU especially in the field textile and confection. There are 360 textile companies in our country applying to the Hohenstein Institute and receiving the Öko-Tex 100 labels. 215 of these companies are located in Istanbul while the others are as follows*: 32 in Denizli, 23 in Bursa, 22 in Tekirdağ, 12 in Gaziantep, 11 in Kayseri, 9 in İzmir, 7 in Adana, 4 in Usak, 4 in Kirklareli, 4 in Ankara, 4 in K. Maras, 3 in Malatya, 1 in Niğde, 1 in Manisa, 1 in Şanlıurfa, 1 in Hatay, 1 in Duzce, 1 in Karaman, 1 in Konya, 1 in Aydin and 1 in Antalya.

There are no companies in Turkey having such a certificate in the field of durable consumption goods like cookers, refrigerators and televisions. In spite of this fact, the producers in our country are manufacturing products conforming to the eco-label standards in reality; but these producers are not so much willing to apply for such a certificate as it is not obligatory in this field and it is not putting barriers in selling their products within the EU countries.

²⁸ United Nations Conference on Trade and Development - Analytical Studies on Trade, Environment and Development

^{*} This Information was taken from Hohenstein Institute



And also All the washing, dishwashing and other household types of materials being produced in Turkey by global companies like Procter and Gamble, Unilever, Colgate&Palmolive and Henkel are completely re-cycling types and the inks used on their packaging materials do not contain heavy metals; resulting in minimum damage on the environment. On the other hand, 80% of the surface active materials have biologically deformable characteristics. As can be seen, these manufacturers haven't received this certificate yet, in spite of the fact that properties of their products are conforming to the eco-label standards. Furthermore, there are only 10 companies in the field of dishwasher detergent and 16 companies in the field of all cleansing goods. The company authorities we had talked about this subject had stated that their products are conforming the EU norms, but it was early to apply for Eco-Label. The most important reason for this is that this certificate is not obligatory and there is no power of punitive sanction involved in this certificate.

Conclusion

Almost in all industrialized countries laws relevant with environment are being drawn up and they have been carried out in a serious manner. This consolidating environmental susceptibility in the industrialized countries affects both the products of international commerce and the exporters who export to those countries. In the EU countries, which are the most important market for Turkey's exportation, environmental susceptibility is becoming more powerful day by day. As a result of gradually rise of environmental susceptibility in the EU countries; the production of environmentally and healthily harmless products has been acquired importance. For that reason, besides several legal regulations in EU, it has been seen that the national environmental labels and EU environment labels valid in all EU countries have being developed. Environment label, i.e. ecolabel, is a medium that demonstrates the consumer the environmental quality of the product. It gives answer to the consumer's requirement of gathering information on the environmental quality of the product. The symbol of environmental label shows that the product has a certain environmental quality, and constitutes a competition effect during purchasing.

When different environmental labels used in the same categorical products, the effect mentioned above is diminishing. In case of having different labels, additional information is required to be able to evaluate the real qualities of each one. This leads to notification of the consumers with so many information and increase of doubts about the reliability of the provided information. The aim of the European Union Environmental Label is to dissipate this confusion of concept. And to constitute an integrity.

Along with those progressions, the exporters to EU market, counter to legal regulations, do not have the obligation to comply with the criteria of the environmental label. Therefore, to utilize the opportunities derived from the green consumption tendencies in the EU, with a view to create a diversity with the product image of sensitive to environmental and human health, the producers could add an extra value to their products by considering these criteria as a market and competition medium. The Eco Label label, slowly improving in Europe is on the path to be the unique valid label in the Union in a short time by superseding all the accepted labels related with environment.



REFERENCES:

Business Europe, *Packaging Problems*, June 5, 1996, p.1. Business Week, Bib Oil Sees The Future- And It's Clean Gasoline" April, 8, 1991. Gegez Ercan, Muge Arslan , Emrah Cengiz, Mert Uydaci, Uluslararası Pazarlama Çevresi, Der Yayinlari, Istanbul: 2003. Kinnear Tom, Ken Bernhardt, Kathy Krentler, Principles of Marketing, Harper Collins Collage Publishers, 1994. Kleiner Art, "What Does It Mean To Be Green", Harvard Business Review, July/Aug, 1991. Kotler Philip, Gary Armstrong, Principles Of Marketing, Printice Hall Englewood Cliffs, New Jarsey, 1993. Lefton Terry, "Beating the Green Rap", Adweek's Marketing, Week, 27 January, 1992. Marketing News, "L'eggs to Scrap Plastic ,egg package", 19 August 1991. Michael Roberts, "Chemical Week", Vol. 156, Issue 18, 1995. Özden Ergun, "Eco Label", IGEME Dergisi, 1999. Salzman Jim, "Green Labels For Consumers", The OECD Observer, Apr/May, 1991. Scerbinski, S. Jacwueline, "Consumer and the Environment: A Focus on Five Products" Journal of Business Strategey, Sept/Oct, 1991. Schwartz, Jeo "Turtle Wax Shines Water Too" American Demographics, April, 1992. Skinner, J. Steven, Marketing, Houghton Mifflin Company, Boston, 1993. Teinowtz Ira "U.S. Government Fights EU on Ecolabel Awards", Ad Age Intarnational May,1997. The European Union And The Environment, Directorate-General For Press And Communication Publications Belgium Choicies For A Greener Future 2002. http://kommanet.nl/greenbus. www.defra.gov.uk. www.ecolabel.com.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



ANALYSIS OF SUSTAINABILITY THEORIES

¹Sabri AZGUN, ²Murat TASDEMİR

¹Yuzuncu Yil University Faculty of Economic and Administrative Sciences ²Osmangazi University Faculty of Economic and Administrative Sciences sabriazgun@yyu.edu.tr

The theories of sustainability come up by debt crisis in developing countries has carry on <u>consistently</u> meaning and currency of its since 1980's. The main purpose of the paper is to provided a overview of approaches to assessing fiscal and foreign sustainability. Sustainability, defined according to solveny condition has maintain in the ranges of intertemporal budget contraint of current economy policy. In this paper, It has been assessed teoritical analysing of fiscal and current account deficits sustainability. Finally sustainability link between fiscal and external is discussed.

Keywords: sustainability, fiscal deficits, current account deficits

1. Introduction

In an economy on the way of sustainable development, inner balance expresses full employment, reasonable budget deficit and price stability; Foreign balance expresses equity of incomes from foreign world and expense to foreign world, so source deficit expresses especially inner (fiscal) and foreign imbalances due to debt coverage and budget deficit and current accounts deficit; to finance the source need appeared by this way by foreign indebtment is possible. In this context, after sustainability analysis of public sector deficit as sustainability indicator of fiscal policy, relation between theoretical analysis of current accounts sustainability and public sector deficit and current accounts deficits due to foreign deficit appeared at the end of applied economy policy is taken up theoretically for sustainability.

Sustainability is ability to perform inner and foreign obligations for country in general meaning. Sustainability (solvency) is defined due to present value budget constraint. In general meaning, if expected present value of future sources of country to serve debt is equal to nominal value of beginning debt stock of economy at least, it can be expressed that economy has capacity to repay. Under these conditions, government will serve its debt in market conditions. So, solvency condition needs provision of present value budget constraint of expected fiscal plans of government (Aegenor and Montinel; 1996 s 126). In this meaning, in case discounting present value of future trade surplus is equal to current foreign indebtedness, it can be expressed that economy has solvency. In case public financing, Solvency implies the equity of discounting present value future budget surplus to current public debt.



2. Sustainability of Public Deficit

Economists examine deficit problem in a different angle of view in stead of size of deficit in any point of time. Economists determine sustainability of primary deficit (debt) by intertemporal solvency measuring the present value of debt. In fact, solvency condition is event of performing current economic policy by taking present value borrowing constraint into consideration. If government gives budget surplus enough to pay accumulated debt and interest, it satisfies present value borrowing constraint. By other words, total current and expected future expenses out of interest expressed in term of present value terms must not exceed the total incomes discounted. In this context, present borrowing value constraint (or solvency condition) will be followed by income and expenses out of interest. (Tanner and Lui:1994, p.511). If these two parameters can not act together, risk of non-repayment debt of government will increase. Most practical approach to reach sustainability is to use government debt as indicator to distinguish non-sustainable fiscal policy from sustainable fiscal policy. However, theoretical literature is focused on whether current fiscal policy can be performed in future without threatening repayment capacity of government.

Analytic discusses of fiscal sustainability take a representative modal as beginning point (Chalk and Hemming; 2000. In so model, government realizes both intertemporal budged constraint and static budget constraint in each period. In closed economy version of such modal not having need to deal with complaints related to foreign debt, if we dispense with monetary thoughts, static budget constraint can be expressed by,

$$B_{t+1} = R_t B_t + D_t \tag{1}$$

Here, B_t is government debt stock in beginning period. $R_t=1+r_t$ is discount factor applied between periods of t and t+1. D_t is fiscal deficit out of interest. If equation no 1 is solved

Gives intertemporal budget constraint. Here, $R \langle t + j \rangle = \prod_{k=0}^{\infty} R_{t+k}$ is discount factor applied

between period of t and t+j. Sustainability (or solvency) from equation no (2) needs excess the present value of future primary budget surplus and present value total of debt stock in beginning and final debt stock. If present value of final debt stock is positive, debt will not be equal to zero up to endless, even a government rollovers its debt by repaying its main money and interest in each period by indebting. By other words, in that case government will fall into ponzi game.

For debtor, the condition of not falling into Ponzi game or transversality condition for creditors are accepted generally as synonymous of sustainability in long term (Cuddington; 1996). Transversality condition as mathematical term expresses that debt must not increase more than interest rate. Otherwise, second term in right side of equation no (2) does not equal to zero and present budget constraints cannot be ensured. In long term, if $D_t-D_{t-1}/D_{t-1} < r$, $\lim_{t\to\infty} R(t+T)^{>1} B_{t+T+1} = 0$ will be provided.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

This is mathematical express of transversality condition in sustainability. Behaviors (or desirousness) of government creditors determine the sustainability of fiscal policies. Not falling into ponzi game implies that transversality condition must ensure $\lim R(t,t+T)^{-1}B_{t+T+1} \le 0$. So, sustainable fiscal policy is to perform needs of present value budget constraint. This condition is expressed by

$$B_t = -\sum_{j=0}^{\infty} R(t, t+j)^{-1} D_{t+j}$$
(3)

Sustainability necessitates that current government debt must be equal to net primary excess of current debt when principle deficits in present value terms are balanced with future primary excesses. By other words, current value of debt becomes equal to present value of expected future excesses when present value borrowing constraint is provided (Wilcox; 1996). The most important result of present value budget constraint is not to exceed out of aforesaid rule related to high budget deficit or high debt while future primary excesses that necessitate to obey aforesaid constraint, form applicable policy option. Transversality condition puts the constraint of not developing debt over interest rate. If high interest rate continues for a long time, debt can grow faster than economy and endless debt-output rate can be possible. Such possibility is not reasonable. So, it is discussed to put constraint over primary fiscal excess. Because government can not increase public revenue more than revenue creating capacity of economy. In this case, condition of $D_{i+j} < \phi Y_{i+j}$ must be provided. Here Y_{i+j} is output and $\phi < 1$. So,

$$B_t < \sum_{J=0}^{\infty} R \blacktriangleleft, t+j \stackrel{-1}{\searrow} \phi Y_{i+j}$$

(4)

is condition for sustainability. This condition brings up the need to limit debt rate, when interest rate is bigger than development rate.

While continuous budget deficits conflict with present value budget constraint, continuous budget deficits (including interest) can be sustainable. A country giving primary surplus covering a part of interest cost of debt in each period can rollover its debt. In each period, totalitarian deficit (including interest) will exist but it will be accepted as sustainable since debt will be grow less than interest rate. Present value budget condition expresses that government must give little deficit in following period after it provides the primary budget balance. Because, this situation conflicts with transversality condition.

Similarly debt rattle gradually decrease to zero in economy developing with relative low interest rate and it accepted as sustainable. In debts growing slightly over interest rate, if growth rate of output is greater than growth rate of debt, debt will be caused to decrease in spite of violation of transversality condition. In conclusion, sustainability judgments based on present value budget constraint are made without applying any economic parameters over government debt stock, planned primary surplus (deficits) and government debt except interest rate.



3. Sustainability of Current Accounts Deficits

Difficulties met to finance domestic expenses from domestic sources make foreign indebting option as a necessity and this situation becoming a problem especially for developing countries. In this frame, foreign debt problem is dealt with basic of sustainability of foreign debt; it is an examination area attracting attention and concern since 1980's when literature related to subject becomes to form. IMF providing fund for foreign deficit pays foreign sustainability attention very much. Logic of foreign sustainability also resembles to fiscal sustainability.

While current account deficits mean increase in foreign obligations of economy, current account surpluses mean decrease in foreign obligation stock. While evaluating continuous current account imbalances, it is needed to take factors effecting foreign obligations of economy into consideration. There is an important relation between current account imbalance and debt repayment capacity of country.

 F_t expressed by real foreign money is net foreign debt obligations of country. TB_t shows trade balance in real foreign money. Net foreign obligations are expressed by,

$$F_{t+1} = R_t^* F_t - TB_t \tag{5}$$

Here, $R_t^* = 1 + r^*$ is world interest factor used to get present value of debt. While high interest rate increases the indebtedness of country, a positive tradenbalance causes an improvement in net indebtedness of country against rest of the world. If equation no (5) is solved, the expression of

$$F_{t} = \sum_{j=0}^{\infty} R^{*} \langle \!\!\!\!\langle , t + j \rangle \!\!\!\!\! \rangle^{\geq_{1}} TB_{t+j} + \lim_{T \to \infty} R^{*} \langle \!\!\!\langle , t + j \rangle \!\!\!\!\!\rangle^{\geq_{1}} F_{t+T+1}$$
(6)

is obtained. Here, $R^* (t, t + j)^{-1} = \left(\prod_{k=0}^{j} R_{t+K}^*\right)$. This is intertemporal foreign constraint. In case

any country cannot rollover its debt, it can serve debt by new foreign indebting. In these cases, to cut to give credit to this county will increase the comfort of creditors. Such case means to enter ponzi game that this cannot be at the end of balance. $\lim_{T\to\infty} R^* (t+j)^{>1} F_{t+T+1} = 0$ is balance condition and means that net foreign obligations of country will not grow more than foreign interest rate. To put this as sustainability condition is expressed by,

$$F_t = \sum_{j=0}^{\infty} R^* \langle \!\! \langle t + j \rangle \!\!]^1 TB_{t+j}$$

(7)

Equation no (7) express that foreign debt can be sustainable in case of foreign trade surpluses in present value term expected to serve net foreign obligations of a country is big enough.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

4. Relation between Current Accounts and Public Sector Deficit Sustainability

For sustainability, relation between current accounts and public sector deficit is not examined systematically. However, there is not any direct relation between sustainabilities of public and current accounts, aforesaid sustainabilities are not independent from each other.

Analysis of aforesaid relation is not suit with national revenue identity. National revenue identity is expressed by

$$TB_t = -D_t + S_t - I_t \tag{8}$$

Here, D_t is fiscal deficit out of interest, TB_t foreign trade balance, S_t private saving and I_t private investment. Parameters are expressed by same currency and if equation no (8) is calculated at net present t value terms for all future periods, the expression of

(9)

is obtained. Equation no (9) can be rewritten as:

$$\left(\mathbf{f}_{t} - \lim_{T \to \infty} R^{*} \left(\mathbf{f}_{t} + j \right)^{-1} F_{t+T+1} \right) = \left(\mathbf{f}_{t} - \lim_{T \to \infty} R \left(\mathbf{f}_{t} + T \right)^{-1} B_{t+T+1} \right)$$

$$+ \sum_{j=0}^{\infty} R \left(\mathbf{f}_{t} + j \right)^{-1} \left(\mathbf{f}_{t+j} - I_{t+j} \right)^{-1}$$

(10)

by using intertemporal budget equation (2) and intertemporal foreign constraint equation (6). Here, assumption of $R^*(t,t+j) = R(t,t+j)$ is made. This assumption is seen as appropriate to reality for a great economy having high capital movement. Because while present values of parameters for foreign sustainability are found, interest rate of great economies are used as world interest rate.

When both fiscal and foreign sustainability is mentioned, equation no (10) becomes like,

(11)

(12)

Such that if net foreign obligations are greater than government debt, private savings must exceed private investment in net value terms to meet foreign debt service in future.

If economy is fiscally sustainable but foreign position is in situation that cannot be sustainable, this situation is expressed by



Private saving is insufficient to meet foreign debt service. In conclusion, private sector net foreign obligations grow faster than foreign interest rate. For example, private sector can rollover net foreign obligations. Risk of not repaying on foreign debt service can be mentioned in case of changing in macroeconomic policies.

Finally, if foreign policy is sustainable but fiscal policy is not sustainable, this situation is expressed by

(13)

Governments finance its deficits by domestic borrowing. Any change in fiscal policy, government cannot perform its domestic debt service.

5. Conclusion

A result development in communication and transport technologies, sustainability definable as desire and capacity of a country to pay current or future public sector or foreign debt obligation and come up by debt crisis in developing countries has been an examination area keeping its importance and currency since 1980's. Public deficit, foreign deficit and relations of these deficits with each other have a special importance to determine sustainability of current economy policy, since budget deficits causes to public sector debts, current accounts deficits to foreign debts. In this study, public sector deficit, current accounts deficit and theoretical relations of these two deficits with each other has been dealt with based on sustainability of mathematical dynamic.

Sustainability definition based on solvency has close relation with taxing and government expenses and is so simple for fiscal imbalances. In case of current account imbalance, sustainability definition is more complex. To use a theoretical model to obtain standard to evaluate that whether actual current accounts deficits are over. Because sustainability of current accounts covers interaction between investment and saving decision pubic and private units in country as well as decisions lending of foreign investors.



REFERENCES:

- Bohn, H. (1998) "The Behavior of U.S. Deficits Public Debt and Deficits" Quarterly Journal of Economics, vol.113, pp. 949-963.
- Faruk Selçuk. (1996) "Consumption Smoothing and the Current Account: Turkey's Experience, 1987-1995" **METU Studies in Development,** 24(4) (1996).
- Hakkio, C. S. and M. Rush. (1991) "Is the Budget Deficit 'Too Large?" Economic Inquiry, vol.29, no.3, pp. 429-445.
- Hamilton, J. D. and M. A. Flavin. (1986) "On The Limitations of Government Borrowing: A Framework for Empirical Testing". The American Economic Review, vol.76, no.4, pp.808-819.
- John T. Cuddington.(1996) "Analysing the Sustainability of Fiscal Deficits in Developing Countries". **World Bank Policy Research Working Paper**, #1784, (Washington D.C.,
- Nigel Chalk and Richard Hemming. (2000) "Assessing Fiscal Sustainability in Theory And Practice", **IMF Working Paper, WP/00/81,**.
- Pierre- Richard Agenor and Peter J. Montinel.(1996) **Development Macroeconomics**. New Jersey : Princeton University Press, Princeton, s.126.
- Tanner, E. and Liu P. (1994) "The Budget Deficit 'Too Large' Some Further Evidence," **Economic Inquiry,** vol.32, no.3, pp. 511-518.
- Trehan, B. and C. E. Walsh (1991) "Testing Intertemporal Budget Constraints: Theory and Applications to U.S. Federal Budget and Current Account Deficits," Journal of Money, Credit and Banking vol.23, no.2, pp. 206-223.
- Wilcox, D. W. (1989) "The Sustainability of Government Deficits: Implications of the Present-Value Borrowing Constraint". Journal of Money, Credit and Banking, vol.21, no.3, pp. 291-306.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



TOWARDS ACHIEVING SUSTAINABILITY IN DEVELOPMENT: A CASE OF VARANASI CITY, INDIA

¹D. MOHAN and ²S. SARKAR

¹Department of Civil Engineering, Institute of Technology Banaras Hindu University, Varanasi/India ²Department of Civil Engineering, Institute of Technology Banaras Hindu University, Varanasi/India devmohan9@yahoo.com; devmohan9@bhu.ac.in saumya.sarkar@civ07.itbhu.org; ssarkar_itbhu@yahoo.com

Rapid and unplanned urbanization is taking place in all developing countries of the world and it is particularly very fast in the continent of Asia. This has led to an enormous increase in pollution of all the three components of biosphere and therefore, it has caused drastic deterioration in quality of life of inhabitants in big cities. As a result, it has become perceptible that the process of development in and around large urban centres in developing world has reached a state of unsustainability due to environmental quality-degradation. With strong possibility of further enhancement in growth rate of urbanization in the near future, environmental conditions are feared to worsen further.

To achieve sustainability in the on-going urban development, appropriate planning-measures in such regions need to be adopted. This paper discusses some of the important issues to be considered in planning of large urban areas to achieve a higher degree of sustainability. As an illustration, the paper presents a case study of the city of Varanasi in India. Varanasi is believed to be one of the oldest surviving cities of pilgrimage in the world. The city is experiencing a process of quite fast and unplanned urbanization due to very high rate of immigration and enhanced pace of industrial and commercial activities. Therefore, this city can serve as a very good example for this type of study. The paper discusses about the prevailing environmental conditions in the city and proposes innovative and effective solutions to achieve sustainability in the on-going process of industrialization and urbanization.

1. INTRODUCTION

Urbanization in mega cities has reached high levels of unustainability. The factors responsible for such conditions are socio-economic, environmental, administrative and a few others. Asia has some of the most heavily populated countries in the world and the urban population is also growing at a fast rate. With the ever increasing population, the cities are becoming heavily over crowded. According to a report of Asian Development Bank (ADB), an additional 1.5 billion people will be added to Asia's urban centers by the year 2020 (ADB, 2001). The population of India is a whopping more than 100 crores and rising steadily. According to certain studies, 50 % of the population is expected to live in urban areas by the beginning of the twenty-first century (Chandrasekhar, 1994). With the increase in population in the cities, problems of poverty and unemployment are intensifying. The number of slum dwellers in mega cities of Asia like Delhi and Kolkata are increasing steadily everyday.



Socio-economic changes such as large increases in population, agricultural output, industrial production and capital, and advances in science and technology have transformed the Asia's natural resource base, which has become a source of material inputs and as a sink for pollution. Environmental degradation in Asia is pervasive, accelerating and unabated (ADB, 2001). These socio-economic factors are playing a vital role in making the growth of such mega cities unsustainable.

The degradation of environmental quality in the mega cities may be attributed as one of the biggest reason for unsustainability. Economic development and poverty alleviation are increasingly constrained by environmental concerns, including degradation of fisheries and forests, scarcity of freshwater and poor human health as a result of air, water and soil pollution. Mega cities in Asia have reached alarming levels of atmospheric pollution due to enhanced industrial activities and increased emissions from automobiles. High levels of environmentally- and physically-harmful gases and particulate matters have been recorded in these cities. Over the years, there has been a substantial increase in air pollution caused by vehicular exhaust emissions due to addition of more and more vehicles on roads to meet the rising transportation demand (Mayer, 1999; Sharma, 1997; Sharma and Khare, 2001). Consequently, very high levels of indoor air pollution have also been recorded in these mega cities. Industrial activities in such mega cities are causing tremendous pollution of the air, water and soil. Noise pollution due to automobiles and commercial activities in such cities is also reaching alarming levels. With the prospects of further urban industrial and population growth, the environmental conditions are feared to get even worse in very near future itself. The deterioration in environmental quality has made urbanization in such cities unsustainable. The paper also provides an insight into the reforms to be implemented for improvement in the state of environment in such mega cities to achieve higher sustainability levels.

2. UNSUSTAINABILITY DUE TO ENVIRONMENTAL DEGRADATION

2.1 Air Pollution

Atmospheric pollution is still on the rise in large urban areas worldwide or has shown only marginal reductions in some places. Air pollution levels in Asia's large cities are among the highest in the world and ever increasing, resulting in serious health-hazards. According to the Asian Development Bank, amongst the 41 cities ranked by the presence of suspended particulate pollution in the atmosphere, 13 of the worst 15 are in Asian developing countries (ADB, 2001). Delhi has for sometime been observed by World Health Organization (WHO) to be the fourth most polluted city in terms of concentration of suspended particulate matter in ambient air (WHO, 1992). One study in Delhi conducted from 1991 to 1994 projected that an increase of 100 micrograms per cubic meter of particulate matter would result in a loss of life equivalent to 1,385 lives in a year, distributed among varying age groups. At the time of the study, concentration of particulate matter in Delhi was 378 micrograms per cubic meter, approximately 5 times the WHO Annual Average Standard. In majority of Asia's most populated cities, levels of pollution exceed WHO guidelines by big margins. Of the 15 cities in the world with the highest levels of sulphur dioxide, 6 are located in Asia. The region's emissions of sulphur and nitrogen oxides in 2030 are projected to be three to four times of their 1990 levels (ADB, 2001).



Ten of Asia's 11 large cities exceed WHO guidelines for suspended particulate matter by a factor of at least three, four exceed acceptable lead levels, and three exceed acceptable ozone and sulphur dioxide levels (ADB, 1997).

Transportation is the major source of air pollution in a large number of Asian cities. According to one estimate, the contribution of mobile sources to the total emission of hydrocarbons ($C_2 - C_9$) in Korea has been found to be more than 70 % (Na *et al.*, 2002). In a recent study on contribution of automobile emissions to air pollution, conducted in Beijing and Guangzhou, it was observed that this source contributed more than 80 % of carbon monoxide (CO) and 40 % of nitrogen oxides (NO_X) (Fu *et al.*, 2001).

High levels of indoor pollution have been recorded in the mega cities of Asia. Indoor air pollution also results from use of biofuels. Burning of wood derived fuels releases CO, NO_X , benzene, formaldehyde, aromatics and particulate matter. Particulate concentrations often exceed 10–100 times the Standards in USA (ADB, 2001). Strong indoor pollution in cities is also due to another cause, popularly known as Street Canyon effect. High buildings on either side of the streets act as the walls of a canyon. The particulate matter and exhaust gases from automobiles are trapped in this man-made canyon. As a result, these pollutants make their way into the buildings flanked on either side of the streets and remain trapped inside the buildings for long. Indoor pollution in these cities has been recorded many times higher than the allowable limits for various pollutants.

The consequences of so high levels of air pollution are clearly perceptible in many Asian mega cities. WHO estimates that 1.5 million people live in unhealthy air. Four to five million children are attributed to acute respiratory infection every year. Air pollution in South Asian cities causes nearly 1,00,000 premature deaths every year and over 1 billion work days of lost or reduced productivity (ADB, 2001). The most significant global problems due to air pollution are climate change, excessive inputs to the nitrogen cycle, the depletion of stratospheric ozone, the transnational movement of toxic substances, loss of biodiversity and ocean water quality degradation. Countries in the Asia and Pacific region contribute significantly to global environmental problems and in turn are amongst the most vulnerable to some of the resultant effects (ADB, 1997; USEPA, 1997).

2.2 Water Pollution

Water quality has been steadily going down due to influx of domestic sewage and industrial effluents. Levels of suspended solids in Asia's rivers almost quadrupled since those of the late 1970s. In Asia's rivers, the median fecal coliform level, an indicator of the health hazards due to contamination with human excreta, is three times the world average and 50 times higher than the acceptable level recommended by WHO (ADB, 2001). Access to safe drinking water is one of the most difficult problems in South and Southeast Asia. In these regions, almost one in two Asians has no access to sanitation services and only about 10 % of sewage is treated at the most upto primary level (ADB, 1997).



2.3 Noise Pollution

The noise levels are increasing everyday in various mega cities of Asian continent. The factors responsible for the elevation in noise pollution levels are heavy traffic, and growing industrial and commercial activities. Road traffic noise affects a large number of people, especially in urban areas and is generally a major source of complaints (Stoilova and Stoilov, 1998). Industrial noise pollution is a major source of hearing impairment in workers. To quote as an example, the coal industry has much higher noise levels than the prescribed limits for occupational noise exposure. The continuous exposure of the workers to such high noise levels can cause noise induced permanent threshold shift (NIPTS) in their hearing (Sharma *et al.*, 1998). Commercial activities also play a significant role in noise pollution in such mega cities. Most of the cities of India suffer from the problem of frequent "power cuts". Diesel Generating (DG) sets are used in many commercial areas to supply the power during these periods of absence of electricity. These DG sets are a major source of air and noise pollution in the cities. A survey conducted by the Central Pollution Control Board in Varanasi (India) shows that the daytime sound levels in the commercial areas well exceeded the permissible limits (CPCB, 2000).

Noise pollution has been recognized worldwide as a major problem for the quality of life in urban areas. Noise effects include various adverse impacts on mental and physical health and also disturbances in daily life activities. It may affect sleep and conversation, lead to annoyance, cause hearing loss and cardiovascular problems as well as bring down job performance (Piccolo *et al.*, 2005).

Thus, it is evident that degradation in environmental conditions in the mega cities is creating serious health consequences and impairing the quality of life of the city dwellers. Besides all these, environmental pollution has also become a major hurdle in achieving economic development and hence, sustainability in urbanization. In addition, huge quantities of various environmental pollutants are also impairing the ecological balance of the Earth as a whole. Ozone Layer Depletion and Global Warming are some of the serious consequences of the heavy pollution. To achieve sustainability in urbanization, it becomes of utmost importance that environmental conditions be improved significantly in all such mega cities

3. ACHIEVING SUSTAINABLE DEVELOPMENT: A CASE OF VARANASI CITY

3.1 Improving the Transportation System

The future of the global environment in coming decades depends on increased national participation in and compliance with international agreements and on the laws operating at national and global levels (ADB, 2001). Attempts to control automobile exhaust pollution by adoption of primary and secondary regulatory measures have only been partially successful in light of ever-evolving regulations in connection with concentrations of various pollutants in the exhaust.



Therefore, multi-pronged strategy need be adopted for effective abatement of the pollution due to automobile exhaust to realize the goal of healthy environment in mega cities of Asia. For gasoline powered vehicles, driving at an optimum speed of 30-40 kmph in case of two/three wheelers and 45-55 kmph in case of four wheelers can be possible only after ensuring an appropriate planning and operation of surface transportation routes. This also helps to a large extent in avoiding harsh braking and frequent acceleration and deceleration while driving, which are highly polluting phases of vehicle-operation. For diesel-powered automobiles, the optimum driving speed should be around 40 kmph (Mohan, 2004).

Efforts to abate automobile exhaust generated air pollution without improving traffic management will not meet desired success. This type of pollution can be controlled by bringing down the total number of vehicle-kilometres traveled either by reducing the number of vehicles on road and/or the kilometres traveled by each vehicle. Introducing bus lanes and priority to buses at traffic intersections can cut down travel time by as much as about 25 %. Dedicated bus lanes have been estimated to enhance the carrying capacity of buses by more than 50 %. Bus corridors can be identified and also a shuttle service along these routes should be provided. If reliable, comfortable, cheap and easily accessible public transport can be provided and proper infrastructural development is ensured, the number of vehicles on road will go down significantly (Mohan, 2004).

To achieve lower emissions of automobile-exhaust pollutants by ensuring smooth flow of the traffic around the least polluting speeds, efforts are being made to develop and apply more and more sophisticated technologies to attain better control on traffic movement. Consequently, many concepts like Intelligent Vehicle Highway System (IVHS) have emerged. IVHS uses the latest technologies to squeeze more transportation from existing capacities of roads, allow the vehicles to move faster and in a fuel-efficient manner, improve highway safety, reduce fuel consumption, ease pressure for new highway construction, make public transportation system more attractive and thus, it helps in reduction of the different air pollutants. Advanced traffic management system can also be applied to monitor the traffic, optimize signal timings on major routes and control the flow of traffic. This will help in mitigation of recurring and non-recurring congestions, leading to reduction in air pollution (Mohan, 2004).

Varanasi is growing very fast into a commercial centre for the geographical region covering the eastern part of Uttar Pradesh, Bihar and also, larger region of Central India. In Indian conditions, vehicular traffic is the biggest single source of air and noise pollution in such large urban areas. Therefore, surface transportation routes need be planned to ensure smooth movement of vehicular traffic. The use of automobiles for mass-transit should be encouraged to bring down a very high number of personal vehicles. Due to the cultural and religious importance of the city, it is very difficult to widen the streets and roads of the city by demolishing the established houses and places of religious worship.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

Geographical location of Varanasi in India is as shown in Figure 1. Main portion of Varanasi city is contained in the region between the holy river Ganges and river Varuna as shown in Figure 2. Ganges, due to its wide channel, has been used historically for purpose of water-transportation. This practice need to be revived to reduce the traffic load due to passenger-transport vehicles and goods-carriers on the roads and streets of Varanasi. The river Varuna may also be used as another transportation route. In addition to this advantage, application of this alternative transportation-model will promote various commercial activities including tourism.



Figure 1: Geographical Location of Varanasi in India



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



Figure 2: Surface Transportation Routes in Varanasi City



3.2 Managing the Water–Resources

To combat the growing water pollution in the mega cities, it is of utmost importance that wastewater must be treated to the best possible extent before its disposal into the water bodies like lakes and rivers. To achieve this objective, efficiency of sewage treatment plants (STP) need be increased. To quote as an example, the city of Varanasi has three sewage treatment plants. The Bhagawanpur STP has a treatment capacity of 9.8 million litres per day (MLD), Diesel Locomotive Works (DLW) STP has treatment capacity of 12 MLD and Dinapur STP has treatment capacity of 80 MLD (CPCB, 2000). But, out of these three, only DLW STP operates at its design efficiency. The other two perform at relatively lower efficiencies than their design efficiencies. This is mostly due to difficulties with availability of electricity throughout all the days and round the year. Thus, partially treated sewage is allowed to flow into the river Ganges many times. As a consequence, the river water quality is degrading. This type of situation may be observed to prevail with a large number of mega cities in Asia.

Due to the pollution of surface water bodies, there is heavy dependence on groundwater for domestic purposes. As a result, the groundwater table in various mega cities is declining at a very fast rate and many problems related to water-scarcity are emerging. To deal with the shortage of water, low cost techniques like rainwater harvesting should be adopted. Domestic, agricultural and industrial water requirements can be met satisfactorily (at least partially) by practicing rainwater harvesting. Appropriate technologies for recycling and reuse of wastewater need also be developed and adopted to meet the water demands in these mega cities. Varanasi receives a high amount of annual rainfall. However, this rainwater is neither conserved nor harvested. With many houses within the city having their rooftop areas greater than 300 m^2 , rooftop rainwater harvesting may prove to be an effective solution for augmentation of the fast depleting groundwater table (Government of Uttar Pradesh, 2003). Roadside rainwater harvesting has also got an immense potential for this city. These steps will ensure reduced degree of dependence on already scarce groundwater resources, which are depleting very fast. In addition, compulsive intake of raw water from the surface water sources, *i.e.*, rivers Ganges and Varuna (which are heavily polluted) may also be avoided, if rainwater harvesting, as already mentioned above, is applied effectively.

3.2.1 Recycle and reuse of wastewater: A case of Banaras Hindu University, Varanasi

The study focused at the assessment of potential water recycling capacity within Banaras Hindu University (BHU) campus. The sullage generated in BHU campus is at least 2.625 MLD and the sewage is 0.75 MLD. In other words, it can be said that the sullage is 958.125 million litres per annum and sewage is 273.75 million litres per annum. Thus, the sewage to be sent to STP for treatment is 22.22% of the total wastewater produced in the same campus. But, because of unscientific practice of mixing the sullage with the sewage, whole of the wastewater mass is converted into sewage and therefore, need be treated before disposing it off safely. If the sewage and sullage components are separately handled, the load on the sewage-conveying pipelines and that on the STP will come down drastically (Mohan *et al.*, 2006).



Only running cost (annual) of STP carrying out the treatment of 3577 million litres per annum is Rs. 11.8624 millions, *i.e.*, the treatment cost is Rs. 3,316.29 per million litres (on the basis of running cost only). Using the sullage and sewage quantities mentioned above, it can be concluded that a sum of about Rs. 3,177,420 per annum can be saved, which is being spent on treatment of sullage from BHU campus alone (which contributes only about 34.44% of total wastewater loading on the STP at Bhagawanpur). In fact, only a sum of Rs. 907,834 per annum will be required to be spent on treatment of the sewage component after separation (Mohan *et al.*, 2006).

This model may be extended to whole of the city of Varanasi to achieve enormous savings in wastewater treatment. This will result in conservation of the surface and groundwater resources also.

3.3 Application of Industrial Ecology

Industries in mega cities all over the globe are one of the biggest sources of air, soil and water pollution. Industrial growth has greatly contributed to increased generation and accumulation of solid and hazardous wastes in many developing countries, outstripping the collection and disposal capacity of various municipal corporations (ADB, 2001).

Pollution caused by the industries can be brought down significantly by using an emerging concept of Industrial Ecology (IE). The pioneer in IE application is Kalundborg, a small industrial town in Denmark. Huge environmental and economic benefits have been achieved by the practice of IE in Kalundborg. The pattern of inter-company reuse and recycling of various wastes has resulted in reduction of air, water and soil pollution; conservation of water and other resources; and generation of new revenue streams from the exchange of various wastes and/or by-products (Indigo Development, 2003). From Kalundborg scheme, an estimated \$15 million collective annual savings have been achieved, primarily on resources, from a total investment of \$90 million. Table 1 shows the estimated resource-savings at Kalundborg (Symbiosis Institute, 2004). Air emissions have also gone down due to these symbiotic exchanges. Carbon dioxide (CO_2) emissions have been reduced by 3 %, *i.e.*, 1,30,000 tons per year. Sulphur dioxide (SO_2) emissions have also been reduced by 25,000 tons per year (Carr, 1998).

Table 1: Estimated Resource Savings at Kalundborg

| Groundwater savings | 2.1 million m ³ per year |
|-----------------------|-------------------------------------|
| Surface water savings | 1.2 million m ³ per year |
| Oil savings | 20, 000 tons per year |
| Natural gypsum | 2,00, 000 tons per year |

In India, Naroda Industrial Estate functions on the lines of IE (UNEP, 2001). Many such IE projects are in their different stages of implementation in USA, UK, Sweden, Australia, Netherlands, China and other countries.



The concepts of industrial ecology may be extended to the city of Varanasi as well. Varanasi faces the problem of frequent power losses. Thus, there is an urgent need for establishing additional power generation establishment to ensure regular supply of electricity to the city for catering of growing demands of power by different fast expanding sectors like commercial, industrial activities, *etc.*. Due to availability of coal from the nearby coal fields located in the Vindhyachal region, installation of a thermal power plant nearby the city is feasible from the point of view of an easy availability of the raw materials. However, there are problems of pollution associated with thermal power plants.

To take care of such problems, appropriate planning of the power plant need be done and proper management of the generated pollutants must be ensured. Positioning of the power plant on the leeward side of the city will be a major consideration in location of the power plant. This will help in directing the air pollutants away from the city. Principles of industrial ecology may be applied to make use of the waste products generated at the power plants. Fly ash generated may be extensively used in making fly ash bricks, for road construction, *etc.*. Hot water may be recycled or used for fish rearing, rice de-husking, and in carpet and dyeing industries. CO_2 generated may be used in greenhouses for growing the vegetables and flowers or for the production of fertilizers.

3.4 Other Pollution Abatement Measures

Indoor pollution in mega cities has also reached alarming levels. Such high levels of indoor pollution are due to the use of bio-fuels. Indoor pollution due to bio-fuels can be drastically reduced by use of solar energy as a substitute. Proper planning of the streets can lead to reduction in indoor pollution due to Street-Canyon effect. The longitudinal axes of various streets and roads should preferably be along the leeward side, so that the pollutants generated there are blown away by the wind. Care should be taken at the city planning stage so that the pollutants are not blown from one zone to other inhabited areas.

Noise pollution is increasingly becoming a problem of terrific dimensions in the mega cities. Automobile-traffic and certain types of commercial activities are the major contributors to this form of pollution. Noise pollution can be reduced by adopting a few general strategies. Proper regulations need be formulated and implemented to ensure that the vehicles do not generate noise more than the prescribed limits. Trees and bushes should be provided between the roads and buildings. DG sets should strictly be provided with acoustic hoods and walls alongwith other possible barriers to noise-propagation. The use of loud speakers in religious places, at the time of marriages and other celebrations and at commercial advertisements, and use of pressure horns on the roads should be regulated. Vibration isolators and dampers should be used in noise-generating machines required to operate in densely populated zones. Decongestion of vehicular traffic, especially in commercial areas, is needed to be carried out on top priority basis (CPCB, 2000).



4. CONCLUSIONS

To achieve sustainability along with the rapid rate of urbanization in the city of Varanasi, a number of innovative steps are required urgently to be taken for improvement in environmental conditions. Surface transportation infrastructure need to be appropriately planned, managed and operated to reach the condition of congestion-free traffic movement along with hindrance-less driving around the least polluting speeds in case of different types of automobiles. Employing the rivers Ganges and Varuna as alternative channels for passenger and goods transport through water-route can prove to be very effective in reducing the traffic congestions and enhancing the driving speeds of automobiles. Consequently, this will bring down the total load of air pollutants, generated in the city by the automotive-traffic. As a result, there will be perceptible improvement in air quality and also, reduction in the noise pollution.

Recycle and reuse of domestic wastewater should be done to reduce the rate of exploitation of locally available surface and groundwater resources. The study carried out for the BHU campus has shown very encouraging results for a large scale application of this concept in and around the city of Varanasi. Industrial estate planning following the principles of industrial ecology will result in lower rate of generation of different types of pollutants. In addition, the application of this emerging concept will lead to consumption of the waste-effluents of certain industries as raw materials for other adjoining industries. This will ultimately result in reduction in the rates of consumption of energy and various raw-materials. It is well known that this is a very important requirement to achieve the sustainability in the process of development. Application of other appropriate strategies as discussed above will be quite effective in achieving an overall state of sustainability in urbanization not only in Varanasi city, but also in many other cities having similar characteristics worldwide.

REFERENCES:

- ADB: Asian Development Bank (1997), Emerging Asia: Changes and Challenges, Asian Development Bank, Manila, Philippines.
- ADB (2001), Asian Environment Outlook, Asian Development Bank, Manila, Philippines.
- Carr, A. J. P. (1998), Choctaw Eco-Industrial Park: An Ecological Approach to Industrial Land-use Planning and Design, Landscape and Urban Planning, Volume 42, pp. 239-257.
- Chandrasekhar, B. P. (1994), Abstract Proceedings of Seminar on Technology for a Better Tomorrow, Kolkata, pp. 41-42.
- CPCB: Central Pollution Control Board (2000), A Report on State of Environment Varanasi, Ministry of Environment & Forests, Government of India, New Delhi, India.
- Fu, L., Hao, J., He, D. and He, K. (2001), Assessment of Vehicular Pollution in China, Journal of Air & Waste Management Association, Volume 51, pp. 658-668.
- Government of Uttar Pradesh (2003), Notification Regarding Rainwater Harvesting in Urban Areas, Government of Uttar Pradesh, June 19, 2003.
- Indigo Development (2003), The Industrial Symbiosis at Kalundborg, Denmark. *Website: http://www.indigodev.com/Kal.html*.



- Mayer, H. (1999), Air Pollution in Cities, Atmospheric Environment, Volume 33, pp. 4029-4037.
- Mohan, D., Sarkar, S. and Kanthi Kiran, T. (2006), Appropriate Strategy for Reduction in Operating Costs of Buildings, Proceedings of Mid Term Seminar on Cost Management in Building Projects [organized by Indian Buildings Congress], January 6 -7, 2006.
- Mohan, D. (2004), Automobile Traffic Generated Atmospheric Pollution: Need for Consideration in Urban Infrastructure Planning, Proceedings of the Third International Symposium on New Technologies for Urban Safety of Mega Cities in Asia, Agra, India, pp. 183-192.
- Na, K., Kim, Y. P. and Moon, K. C. (2002), Seasonal Variations of the C₂-C₉ Hydrocarbons Concentrations and Compositions Emitted from Motor Vehicles in a Seoul Tunnel, Atmospheric Environment, Volume 36, pp. 1969-1978.
- Piccolo, A., Plutino, D. and Cannistraro, G. (2005), Evaluation and Analysis of the Environmental Noise in Messina, Italy, Applied Acoustics, Volume 66, pp. 447-465.
- Sharma, P. and Khare, M. (2001), Modeling of Vehicular Exhaust-A Review, Transportation Research, Volume D6, pp. 179-198.
- Sharma, O., Mohanan, V. and Singh, M. (1998), Noise Emission Levels in Coal Industry, Applied Acoustics, Volume 54, Number 1, pp. 1-7.
- Sharma, M. (1997), Combating Vehicular Pollution: Options and Approach, Environmental Pollution Control Journal, pp. 7-10.
- Stoilova, K. and Stoilov, T. (1998), Traffic Noise and Traffic Light Control, Transportation Research, Volume D3, Number 6, pp. 399-417.
- Symbiosis Institute (2004). Website: http://www.symbiosis.dk.
- UNEP: United Nations Environment Programme (2001), An Eco-Industrial Networking Exercise in Naroda Industrial Estate, Ahmedabad, India. Website:http://www.uneptie.org/pc/ind-states/casestudies/Naroda.htm.
- USEPA: United States Environmental Protection Agency (1997), Emerging Global Environmental Issues, Office of International Activities, Washington DC, USA.
- WHO: World Health Organization (1992), Air Quality in Mega Cities of World, World Health Organization Publication.



SYSTEM PROBLEMS FOR REGION SUSTAINABLE DEVELOPMENT: THE INDICATORS AND INDICES BUILDING

M. ZGUROVSKIY, G. STATYUKHA

National Technical University of Ukraine «Kiev Polytechnic Institute» Peremogy ave., Kyiv, Ukraine, kxtp@xtf.ntu-kpi.kiev.ua; gen.statyukha@mail.ru

The paper focuses on the problem of sustainable development at the regional level. Following the system approach principals, the effective project structure for the regional indicators and indices system is considered. It includes the organizational, methodological, information, and operation provisions. The content of mentioned provisions and many – level hierarchic model is proposed. The example of system development for the sustainability of enterprises is demonstrated. It is based on the system of indices and principals of its convolution to integrated index.

Key Words: sustainable development, indicators and indices, system approach, provision structure, hierarchic model, potential hazard evaluation.

1. INTRODUCTION.

The indicators of sustainable development provide the extremely important basis for decision making in many directions of society progress. They promote to transfer the knowledge in physical and social areas to controllable information blocks furnishing the decision making process. For society, the indicators guarantee the early notification aiming to prevent its critical state and in the economical, social and environmental sphere. As last but not at least, they are very important tool in the ideas and values exchange. This is why the lot of papers is dedicated to the problem of indicator building and application especially at the country level. [1]

From the other hand, in the standard industrial practice, the optimization for productivity, cost for process and product and sustainable development comes very slowly, f.e. through the ISO [2]. In this work, authors make an attempt to comprehend the problem and experience of indicators building in the frame of region which includes some enterprises and corporations and their interaction with the indicator system of higher level – city, oblast and country.

2. THE DEVELOPMENT OF PROJECT FOR THE SUSTAINABLE PROGRESS OF REGION.

For the successful realization of regional indicator system, it is expedient to develop the special long time project aiming to create, implement and support the Regional Indicator Program (RIP) as a part of National Program for the monitoring of sustainable development goals achievement and decision making. Notice, the methodological treatment of international institutes for the sustainability metrics have to take into consideration.



Since the process of project realization in a whole, demands the regional human and financial resources distribution, it is important to apply the system approach. Here, the effective system structure of project provisions can be recommended [3].

The problem of organizational (management) provision (OP). In the management provision, the most important step of project is creation of Coordinate Mechanism for RIP development. It is essential to equip the net of regional partners interesting in definite information. It also must be the part of National Coordinate Mechanism. Its realization in the form of Working Group should be set up on the basis of existent social structure and experience. This Mechanism must be sufficiently flexible and transparent assuming the wide opportunity for consulting and participation of all information holders to this process involved.

The second important part of OP can be the creation of Virtual Scientific Innovation Center (VSIC) for sustainable development problems. The function of this Center is to support interaction between scientific and engineer groups provided by innovative, instrumental and industrial resources in the geographically distributed area – region and, possibly, out of it limitation.

The third but not the last part of OP can be setting up of Special Division for the implementation of environmental control standards [ISO - 14001, ISO - 14040] as a tool to favor the sustainable development of enterprises. The system interaction between different organizational structures will guarantee the affective regional development in the direction of sustainability.

The problems of methodological provision (MP). Before to start the project treatment, the developers should estimate the real situation of indicators usage in region. In particular, it includes the answers for the questions: what indicators are already in practice, who are applying it and with what purpose, how they are correlated with the proposition of International Committees for sustainable development. It is very important to make survey of data already collected for the indicators calculation: who is compiling them, where they are placed. Here, the modern methodology like ESI – 2005, must be taken into consideration [4]. The most important step in the treatment of MP is estimation of national priorities and its consideration through the indicators selected.

The problems of information provision (IP). It is well known, the indicators are synthesized on the basic of variables, which in turn are furnished by the monitoring system. However, we have to emphasize, that statistical data should be subjected with the special analysis to become the variables for indicators calculation.

This is why the developers of IP should include the next estimation procedures: availability of data for indicators; the sources, continuity, reliability and delivery of data; reliability of channels for the person making decision and others.


The collection and treatment of individual data for definite variable have to impose upon appropriate organization as a duty. The last provides the quality of data and their modernization. The regional government should realize that it has to take the main responsibility on data collection and its truthfulness.

The investment to the system data collection must be more than to the process decision making contribution. It is necessary to look for the international and state supporting for the regions which and state supporting for the regions which have not the sufficient recourses to collect the essential data. It is very important to direct some forces for new data extraction for the variables and indicators missing at the first stage of realization.

The problems of operation provision (system of attendance) (OPP). It is evident that the efficiency of indicator system essentially depends on the correct operation and the ability of updating in accordance with new scientific results. The Working Group can work out the governmental web-side or other mechanism for the regulation of indicator treatment process in different stage. Simultaneously, it provides the communication tool and feedback with participants of regional system.

We considered the variety of provision proposed and the set of their functions as a many-level hierarchic model (Fig.1) [5]. The volume of provisions is essentially changed from level to level. Evidently, the role of organizational provision at the technology level is extremely small and is often "transmitted" to the control system. On the other hand, although the technology system is not "physical" at the level of corporation, it must be presented in the form of models for all levels where the decisions are making. The results are directed to the low levels in a form of assignments. The working out of hierarchic model with all provision is the main task of regional sustainable project.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



Fig.1. Interactions between different level subsystems in the hierarchical model for the region sustainable development (MP, IP, OP, OPP - accordingly methodological, information organizational, and operation provisions).



3. THE EXAMPLE OF SYSTEM DEVELOPMENT FOR THE SUSTAINABILITY OF ENTERPRISES

In NTUU "KPI" for the lowest level of hierarchy, the methodology for the sustainability of enterprises was developed. The methodology developed can be applied both for the operation industrial enterprises, aiming the evaluation of its relative potential hazard for the region considered, and for the design of new enterprise, aiming the sites selection by the criterion of potential hazard.

For the potential hazard evaluation, some notions were introduced: index of absolute and relative hazard, unitary risk index and potential damage index. Some dependencies were proposed for its calculation. Here, the state parameters of processing, equipment, quality of service etc. that are endogenous factors and viable indices of enterprises like transport accidents, natural calamity etc. that are exogenous factors are taken into account. The index of regional hazard is also introduced as a relative hazard description for enterprise location. It allowed for social and geographical peculiarities having an influence on the damage from unpredicted accidents. The general scheme of safety indices for technogenious objects is presented on the Fig.2. This methodology is supplemented with computational means in a form of software allowing the more correct decision making [6].



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



Fig.2. The general scheme of safety indices for technogenious objects.



Building of integrated indices of sustainable development. In Institute of Applied System Analysis (NTUU "KPI"), the principals of measurement system for the sustainable development are worked out [7]. The sustainability metric for the each level *n* of hierarchic model is proposed to estimate with the help of index I_{SD}^n , which is calculated as a sum weighted for the three type of indices – economical $\langle n_{SDEC} \rangle$, environmental (I_{SDEN}^n) and social $\langle n_{SDS} \rangle$. Each of indices is calculated on the basic of indicators and indices known in international practice (so, for the I_{SDEN}^n , the index ESI – 2005 can be used). The problem of indicator and indices dimension can be solved by standardization of metrics to the rage 0 – 1. In this case, the worst values of indices will correspond of members closely to zero but the best ones will put it info closer contact to unit.

This principals of sustainability metric can be presented for the technogenious object safety as: $I_{SD}^1 = E_1 \times I_{RS_i}^1 + E_2 \times I_{PT_j}^1 + E_3 \times I_{EX_k}^1 + E_4 \times I_{TK_l}^1$, there E_{1-4} are the expert estimations weighted. The index sensitivity analysis to the indicators and variables will allow to change the expert estimations in accordance with region peculiarities.

The methodology developed can be transferred for the other subsystems and levels of hierarchic model. Notice, the value of other ingredients of sustainability – economical and social – will grow from the level to level that have to take into consideration in all provisions described above.

4. CONCLUSION

There are the main tasks enumerated for the building of indicator and index system in separate region. We are sure the part of this problems remains out of our attention. One of such problem is deserved to be mentioned.

Simultaneously with realization of provisions proposed, it should be recommended to think out the more systematic approach for the variables changing and justification of inevitable chanting in such way that system of indicators can show where the new or best data are needed. From this, the necessity follows for permanent work with methodology of indicator and index building. We also hope the proposed system of provision and indices for region creates the possibility to reduce the informational gap in the formation of process protection for the environment and society development.



REFERENCES:

Indicators of Sustainable Development: Guidelines and Methodologies, 2-nd ed., New York, UN, 2001, 320pp.

Subhas K.Sikdar. Jorney Towards Sustainable Development: A Role for Chemical Engineers. Environmental Progress, 4(22), 2003, 227-232.

Statyukha G.A.. Computer aided design for chemical technological systems, Kiev, Vyscha shcola, 1989, 400pp. (in Russian).

2005 Environmental Sustainability Index, Yale Center for Environmental Law and Policy, Yale University, center for International Earth Science Information Network, Columbia

University, www.yale.edu/esi.

Zgurovsky M.Z.; Pankratova N.D. Systems analysis: problems, methodology and applications. Kiev, Naukova dumka, 2005, 743 pp. (in Russian).

Bendyug V.I.; Boyko T.V., Statyukha G.A.. Development of software system for safety estimation of industrial enterprises. Visnuk Jutomurskogo derjavnogo tehnologichnogo Universutetu, 2004, 2, 155-163. (in Russian).

Zgurovskiy M.Z.. Ukraine in a global metric of sustainable development. Zerkalo nedeli, 2006, 19, May 20-26. (in Russian).



ENVIRONMENTAL ENRICHMENT BY WATER THE CASE OF SARDAR SAROVAR PROJECT, INDIA

Vivek P. KAPADIA, Mukesh B. JOSHI

Sardar Sarovar Narmada Nigam Ltd. Block No. 12/4, Sardar Bhavan, Gandhinagar, Gujarat. vivekkapadia@hotmail.com,dr_mbjoshi@hotmail.com

WATER AND THE ENVIRONMENT

The environment and its pivotal element – water, both have been given profound respect and their values for protecting human life have been prayed for in the ancient Indian scripture. For example, Apah Suktam from Rig Veda, VII. 59.2 aptly says –

"Ya apo divya uta va sravanti khanitrima uta va yah svayamjah samudratha yah suchayah pavakastha apo deviriha mamavantu"

[May the waters that are in the sky, or those that flow (on the earth), those (whose channels have been dug, or those that have sprung up spontaneously, and that seek the ocean, all pure and purifying, may those divine waters protect me here (on earth) (Wilson, 1978)]

Water is not simply known for its scenic beauty but for its life sustaining value - rather there is no life without water. It is mainly water that differentiates planet earth from others where the efforts to find out life have not succeeded till date - for want of water. Water and the Environment are so inextricably intertwined that an environment without water (means without life too) is not acceptable to any sane person even in imagination! Role of water in making and shaking of the environment has been aptly recognized throughout - right from the ancient Indian scriptures like Vedas to the UNCWE Declaration (Dublin, 1992) and even in the UNCED Declaration (Rio de Janeiro, 1992), Hague Declaration (2000), the Millennium Development Goals and the ongoing Global Dialogue on Water, Food and Environment. Efforts of developing water resources are at times questioned on the environmental ground, but even the eco-romanticists opposing such development 'per se' and 'tooth and nail' have to agree that water scarcity causes environmental degradation in more than one ways. Environmental impact assessment for any developmental activity is a prerequisite. However at the pivot and in the swirl of this debate is always 'water resources', which underscores the fact that water is not merely 'one of the entities' of environment. The Human Development Report of UNDP lists developing countries according to a composite 'Human Poverty Index', which uses "access to safe water" as an indicator. The critical need is to understand the relationship between environment degradation and poverty and to develop environmentally sustainable programmes and policies leading to economic and social justice in an atmosphere congenial to healthy and happy living for everybody (Gadkari, 2002). It is also widely acknowledged that poverty (deprivation in well being) and scarcity (a relative term) inadvertently become major causes for environmental degradation. On the other hand poverty alleviation attempts can help reduce the pressure on the environment.



WATER SCARCITY AND SUSTAINABLE DEVELOPMENT

Right to Development is a universal inalienable right and an integral part of fundamental human rights (The UN, 1986). Effective realization of the 'Right to Development' has been emphasized as a matter of utmost urgency by the Millennium Forum of the UN. However, experience over time and space has shown that scarcity of water poses serious threats to human efforts for sustainable development. The Paris Declaration (1998) expressed serious concern about "a situation in which a quarter of world's population does not have access to safe drinking water; more than half of mankind lacks adequate sanitation; poor water quality and lack of hygiene are among the primary causes of death and disease; and scarcity of water, flood and drought, poverty, pollution, inadequate treatment of waste and lack of infrastructure pose serious threats to social and economic development, human health, global food security and the environment."

In water scarce regions 'thirst' becomes equally relevant as 'hunger' in other parts. Any plan of sustainable development of such region is incomplete without quenching thirst first. Plight of the people in such water scarce regions need to be empathized before imparting them any lesson on environmental management of a developmental process. Socioeconomic imbalances induced by water scarcity seriously constraint the sustainability of the developmental process and impairs the quality of life, which in turn degrades the environment. If important issues on poverty were ranked according to their interaction intensity, water would be on the first ranks. If all water poverty problems were solved first, some poverty problems independent of water would be left out but the world would be much more happy and beautiful than today (Halis Akder, 2002).

WATER AND ENVIRONMENTAL SCENARIO OF GUJARAT STATE, INDIA

Gujarat State, having geographical area of 19.6 million ha and current population of about 58 million, is located in the western part of India between 20.60° and 24.42° north latitude and 68.10° and 74.8° east longitude. It is relatively urbanized and economically progressive state having its per capita income 31% higher than the national average. Average annual per capita availability of water of less than 900 m³ reflects the water scarcity in the state following the UN criterion of 1000 m³ per capita per year. Gujarat is traversed by 17 major and 168 minor rivers, of which only 8 are perennial.

Regional imbalances : Water availability & quality

As compared to the geographical area and population, the state is naturally underprivileged so far as water is concerned – has just 2.28% of India's water resources. This is again constrained by glaringly stark inequalities in intra-state distribution, with 80% water resources concentrated in just 20% southern area leaving rest 80% area of the state with just remaining 20% water. Water Resources Management in the state has been challenging with peculiar topographical features like 1600 km long coastline and 11.5% desert area. Area affected by salinity which was just 9% of the total geographical area in the year 1947 is estimated to be an awesome 23% by the year 2010 (GEC, 1998).



The whole range of efforts to harness the available water resources has been attempted by the state ranging from major inter-basin transfers to medium and minor projects and even micro water harvesting structures. The state has an average annual rainfall of 80 cm with a high coefficient of variance over time and space and as a result droughts are frequent. Most of the area of the state falls in arid or semi-arid zone. On an average in each decade three years were drought years since the state came into being in 1960. In water scarce regions domestic water is fetched from even 6 to 8 km distances. During drought years, Government has to spend millions of rupees on temporary water supply measures, which includes water transport by road tankers, water special trains and even ships. Acute water scarcity also results in seasonal forced migration of people and cattle. In the absence of alternative source of water, ground water has been over-exploited in many areas of the state resulting into fast depletion of groundwater table (Figure -1). Water mining situation prevailing in some areas have constrained the Government to put ban on further extraction. Water scarcity and water quality are closely interlinked by 'cause - effect' relationship leading to serious water pollution problems. More than 25% villages of the state are suffering from excessive fluoride, nitrate or salinity. There are reported incidences of dental and skeletal fluorosis in the areas subject to water with excessive fluoride. Water quality of all major surface water bodies i.e. rivers, lakes, tanks and creeks have deteriorated to an alarming state for the environment.

Environmental Status

Forest cover

Out of total geographical area of 19.6 million ha in Gujarat, forest area is 1.91 million ha which constitute only 9.63% of total area as against national average of 23%. Out of that nearly 6.6% is under vegetative cover. The wide variations in Geophysical and Eco-climatic conditions ranging from hot saline deserts to humid hilly tracts and from coast to high hills have resulted in to formation of various types of forest. The forest areas of Gujarat are unevenly distributed. The major concentration of forests is found all along the eastern border of the state and the hilly portion of Saurashtra. The forests are found mainly in the districts of Dangs, Valsad, Surat and Junagadh. On the basis of forest classification following major types are found Gujarat:

• Tropical moist Deciduous Forest

These forests occur in the regions having an annual rainfall of over 1200 mm and are found in the Southern most part of the state in the districts of Surat, Valsad and Dangs. These forests form the main source of commercial timber in the state. Teak, Haldu, Sisam, Khair, Katas, Manvel etc. are the main species of these forests.

• Tropical Dry Deciduous Forest

These forests thrive in the region having the rainfall between 600 mm to 1200 mm. These forests are found in the central part of the state in the districts of Bharuch, Vadodra, Panchmahals, Sabarkantha and parts of Saurashtra in the districts of Amreli, Junagadh and Jamnagar.

• Northern Tropical Thorn Forest

These types of forests occur in the region with less than 600 mm rainfall. These forests are found are found in district Banaskantha, Rajkot, and parts of Bhavnagar, Junagadh, and Kutch. These forests contain spare and stunted growth of species like Acacia and thorn bushes

• Littoral and Swamp Forest



Mangrove forest are found in the coastal creeks in the state in the districts of Kutch, Jamnagar and Junagadh. The main species found in these forests is Avicenia sp. Out of 207 subtypes of forests, recorded by Champion and Seth, 31 subtypes, (14.7%) have been identified in the state.

According to one study in the year 1984, approximately 11 million tones of fuelwood and 1.341 million m3 of timber is required per year. Against this production of timber is only 0.14 million m3 i.e. hardly 10% of the total requirement. Due to vast difference between production and demand value of timber has gone higher which has attracted anti-social elements for illicit cutting of trees.

Wetlands

It would not be an exaggeration to state that Gujarat is originally "a land of Wetlands" in India. A study conducted by Space Applications Centre (SAC), Ahmedabad in 1998 estimated wetland area in the country at about 7.58 million ha, and that of Gujarat at about 2.72 million ha (36%). Of 831 wetlands in the state, 438 are coastal and 393 are inland (including 231 small and big reservoirs). Inland wetlands are important water resources replenishing groundwater and sub-soil aquifers. Coastal wetlands, including mangroves and coral reefs, often function as natural barriers against salt-water intrusion, protecting coastal land and inland water habitats. In Gujarat, the coastal and inland wetlands cover 92.3% and 7.7% of the total wetland area respectively, which clearly shows the criticality associated with water availability (both quantitatively as well as qualitatively) for the inland wetlands. Gujarat State recognized geomorphological, floral and faunal values of important wetlands and constituted seven sanctuaries to preserve total area of 1.3 million ha. Unfortunately almost 93.5% of wetlands in the state are in the water scarce and water stressed regions. Acute and perennial water scarcity in some parts of the state have transformed the wetlands into dry lands posing serious threat to this vital link in the hydrological cycle that provides a multitude of services like purification and regulation of flows, fisheries, habitat provision to plants, animals and micro-organisms; providing opportunities for recreation and tourism; and so forth. If managed properly intrinsic hydrological functions of the wetlands can act as buffer against such extremes as droughts and flooding.

Existing National Parks, Sanctuaries

Gujarat is a unique state that has many kinds of habitats which are home to some extremely rare wildlife. The Asiatic Lion is found only in Gir. The Wild Ass in the Rann of Kutch, the rare great Indian bustard in the bird reserves, the world's only four-horned antelope and the Black Buck are some other valued species protected in Gujarat. The dugong and the rare boralia species also find a safe heaven here. There are four National Parks and twenty one Sanctuaries in Gujarat State but again out of these three National Parks and seventeen Sanctuaries are located in North Gujarat, Saurashtra and Kutch regions which are facing water scarcity. **Figure - 2** clearly shows that most of these national parks and sanctuaries are located in the drought prone areas, which itself speaks about the seriousness of water scarcity from environment point of view.



SARDAR SAROVAR PROJECT – THE SAVIOR FOR ENVIRONMENT

Sardar Sarovar Project, one of the largest water resources project of the world, is a muti-state, multi-purpose project to harness 11.7 BCM of river Narmada water annually for Gujarat as well as drought stricken areas of neighboring non-riparian state of Rajasthan (**Figure – 3**). River Narmada is the fifth largest river of the country and the largest west flowing river. Sardar Sarovar Project is at the terminal (downstream) end of the integrated Naramada river valley development which will include 31 major, 135 medium and about 3000 minor dams. Development and environment are two sides of the same coin and it is recognized that sustainable development is not possible without adequate environmental protection measurers. Sardar Sarovar project is the first major river valley project which is subjected to exacting environmental conditions imposed by the Government of India at the time of according clearance to this project. This is also one of the first projects where environmental impact assessment has been undertaken through agencies even when the project was in planning phase.

Salient Features

Included in the 'Eight Modern Wonders Abuilding' by the TIME magazine (January 24, 1994), Sardar Sarovar Project is a unique project in many ways. It envisages construction of a 1210 m long and 163 m high (from the deepest foundation level) concrete gravity dam to create a 214 km long, 1.77 km wide reservoir with gross storage capacity of about 9.5 BCM. With an aggregate volume of concrete of 6.82 MCM this dam ranks second in the world only next to Grand Coule Dam, USA. Its spillway discharge carrying capacity of about 87 thousand cubic meter per second makes it third largest in the world - next to Gazenba, China and Tucurri, Brazil. There are two power houses - 1200 MW River Bed Power House and 250 MW Canal Head Power House - with total installed capacity of 1450 MW. The underground River Bed Power House has six units of Francis type reversible turbine generators of 200 MW capacity each and it can pump back the water in the reservoir during off-peak period of power generation. This pumped storage scheme is the largest in the country and even its 6.95 m diameter runner weighing 120 tonnes each and produced in one piece are unique. The Canal Head Power House is a surface power house with five units of conventional Kaplan type generators each of 50 MW capacity, which divert the water to the canal network after power generation.

The Project is planned to have one of the largest irrigation canal networks of the world. Its 532 km long main canal with discharge carrying capacity of 1133 cubic meter per second is no less than a man-made river. There are 42 branch canals off-taking from the Main Canal and the total length of the canal network including sub-branches, distributaries, minors and sub-minors is estimated to be about 66 thousand km. This network has thousands of control structures, communication structures (rail and road bridges) and cross-drainage structures, some of which are unparallel in dimensions and are truly engineering marvels.

Inbuilt Environmental Safeguard Features



In some large scale irrigation projects water-logging in the command area has been observed as an undesirable consequence. To prevent any such phenomenon in the command area, upper higher part of the canal network would be lined with concrete or masonry lining. Also the entire command area of 1.8 million hectare is divided into 13 different agro-climatic zones and optimum cropping patterns have been worked out by extensive mathematical model studies and keeping in mind the sustainability of irrigated agriculture. Canal network will be operated with a Supervisory Control and Data Acquisition (SCADA) based Remote Monitoring and Control System. Irrigation Water will be supplied to the farmers' co-operative societies on volumetric basis.

The ministry of Environment and Forests had laid down certain stringent conditions at the time of giving clearance to the project in the year 1987. So as to comply with the conditions of clearance, following programmes have been undertaken.

- Forest Conservation Programme
- Fisheries Development
- Health Aspects
- Archaeological Aspects
- Eco-Tourism Development

Project Benefits

Sardar Sarovar Project offers following direct benefits :

- Drinking water to 8215 villages (including 7491 "no source" villages) and 135 urban centres benefiting a projected population of 24.3 million in the year 2011 and 29.26 million in 2021.
- Irrigation to 1.8 million ha land encompassing 3360 villages with 75% dependability, 75% of the command area is drought-prone and more than 52% beneficiaries marginal and small farmers (less than 2 ha holding)
- Increase in Agricultural Production 8.7 million Tonnes per annum, worth US \$ 430 million, of which foodgrain, edible oil and cotton amounts to 4 million Tonnes
- Irrigating 75000 ha of strategic desert area of Rajasthan and 37500 ha in the tribal hilly tract of Maharashtra state.
- Renewable and environment friendly hydropower to the tune of 1007 million kWh in a surplus year and 856 million kWh in a deficit rain year.
- Flood protection to 30000 ha in riverine reaches covering 210 villages and Bharuch city, benefiting to 0.4 million people.
- Generation of over 1 million jobs mostly in rural areas.

Current Status



The Project is currently in its advance stage of completion. Although under construction, with almost 95% of the concreting completed in the main dam, the main dam has already started giving relief by drought proofing and flood moderation. Both River Bed Power House and Canal Head Power house are operational now. The main canal construction is almost over right upto Gujarat-Rajasthan border (458 km length) and it is conveying water upto 370 km as on today. Works of Branch Canals are either completed or are in advance stage of completion. Part-operation of the canal conveyance network supplemented by pipe network since last four years has helped in transferring Narmada water to the water scarce regions of Saurashtra and Kutch (**Figure – 4**). Irrigation benefits have already been extended to a command area of more than 0.5 million ha and the command area development works are under progress in rest of the area.

Environmental Enrichment Measures

The measures specifically aimed at neutralizing or offsetting negative environmental impact of the project include the following :





The State is administratively divided into districts which are further sub-divided into sub-divisions (talukas)

Figure – 1 Groundwater Over- exploitation in the State





Figure – 2 Existing National Parks and Wild Life Sanctuaries



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



Figure – 3 Inter Basin transfer of Narmada water



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



Figure – 5 Unbiased Manifestation of Afforestation



Catchment Area Treatment

Treatment of the catchment area in 27204 ha forest area and 1953 ha non-forest area by way of plantation has been completed long back, which has resulted into multi-storeyed and multi-layered forest eco-system. There has been sustained improvement in the floral and faunal diversity. Rare endangered trees like Creya Arborea, Coclospermum Relgiosum, Oroxylum Indicum, Ougenia Oobeinensis, Casea Tomentosa, Boswellia serrata have flourished. With the protection of soil erosion, better grasses like Themeda, Appluda and Dicanthium have replaced poor species like Aristid, Erogostris, Hetropogan and others. The faunal bio-diversity have also increased with the improvement in vegetation. Panther, Hyena, Jackal, Porcupine and few four horned antelope can now be easily seen. With the increase in the density of tree cover, birds like Golden Oriole, Treepic, Drongo, White Breasted Kingfisher, Muniyasand lora can now be seen. A Remote Sensing Study of Catchment Area Treatment has shown that closed forest and open forest area have increased by 3273 ha and 3001 ha respectively (**Figure – 5**). The degraded forest area has decreased considerably from 12746 ha to 7019 ha.

Compensatory Afforestation

As against submergence of 4523 ha of forest land in Gujarat, compensatory forests over 4650 ha of non-forest land (notified as forest land) have been grown. In addition, 9300 ha of degraded forests in nearby districts have been rejuvenated under 'Project Impact Area Plantation' programme.

Dam Vicinity Area Plantation

Plantation in 240 ha area in the vicinity of dam has been completed which includes reservoir fringe plantation to prevent erosion.

Canal Side Plantations

In parallel to the progress of the canal network, canal side and borrow area plantation in 3510 ha is completed and further work is in progress. This is in addition to the Project Area (at dam site) plantation in 311 ha, Project Colony plantation in 110 ha and Riverine land afforestation in 200 ha.

Innovative Features through Public Participation

In addition to what was planned in the Project Report, certain innovative features have also been included through public participation, few important are briefly narrated below:



Realization of Inter-basin Water Transfer

Taking advantage of the early completion of the main canal and a few major branches, water was flown into these completed canals. As irrigation in the entire command is presently not possible for want of water distribution network right upto the farm level, such water was flown into the en-route rivers through the Escape structures provided on these canals. Realization of Inter-basin Water Transfer this way has not only helped in recharging the groundwater but also in diluting the pollution concentration in the en-route rivers and thereby improving water quality. During this recharging process, many frenchwells and tubewells which had become defunct have been rejuvenated.

Deepening and filling of Village Tanks

In construction of the vast canal network of Sardar Sarovar Project, there is a policy to deepen the nearby village tanks and utilize this borrowed earth in the construction of embankments. This has helped in enhancing the storage capacity of these tanks for rain water harvesting in future. Ultimately, 3393 tanks are planned to be deepened with a corresponding increase in storage capacity of 213.60 MCM. Thus, creation of micro water harvesting structures is an integral part of planning and implementation of Sardar Sarovar Project.

Filling of enroute village tanks with Narmada water has also been taken up during last four years. Current year also, about 1200 numbers of village tanks were filled up with Narmada waters creating additional offline storage thereby.

Micro Hydel Power Generation

While the Narmada Main Canal is a contour canal, branch canals offtaking from it are ridge canals. Depending upon the topography of the region, at certain points in the network vertical drops of 1 to 13 m depth are required to be provided. The Project envisages harnessing such potential sites for micro, mini or small hydel power generation. At present 60 numbers of potential sites have been identified with installed power generation capacity ranging from 50 KW to 16 MW, aggregating to a total of 111 MW. Decentralized hydro power generation in the canal network would not only supplement the state's efforts to bridge the demand-supply gap, but it will also help reduce the pollution to that extent.

Initial Results

Initial results of this mega human endeavor have started surfacing.

Relief from fetching water

With the help of extensive canal network and pipe network domestic water is being supplied to villages at a distance of upto 700 km from the reservoir. This has been a great relief to the people from their daily drudgeries, particularly for women and children. This in turn will brighten the opportunities for their education and other productive or household work. Even trends of seasonal migration are checked. Availability of water is becoming a growth engine leading to poverty eradication and thus reducing pressures on the environment.



Groundwater recharge

Groundwater recharge by an array of water releases (rivers, tanks, agricultural farms and special recharge wells) has yielded positive results. In the areas where yearly depletion was 2 to 3 m, it has been checked and even reversed with net increase in the ground water tables. Defunct wells have been rejuvenated and availability of ground water at lesser depths in some areas have helped reducing electricity consumption – indirectly reducing pressure on thermal power generation and thus reducing pollution.

Improved quality of water

Release of significant quantity of Narmada water in the dry bed of at least twelve other rivers of the state has helped in flushing out the pollutants in the river stretches which was not possible since quite some years for want of adequate rainfall and runoff. This has improved the quality of water to a considerable extent. Millions of people have been saved from forceful drinking of poor quality water containing excessive fluoride, nitrate or salinity.

Environment friendly power generation

With the commissioning of both River Bed Power House and Canal Head Power House, hydropower generation with an installed capacity of 1450 MW has commenced. With the main dam still under construction, full design head is not available for power generation, however 2600 million units of environment friendly power generation has been possible. Reducing emissions has become a statutory requirement following the Kyoto Protocol of December, 1997 which was signed and ratified by India in August 2002. It may be noted here that even after observing the environmental control regulations on permissible limits of emission, a thermal power plant of same installed capacity would throw out in air, 10780 tonnes of suspended particulate matter and 25700 MT of sulphur dioxide per year. Thus Sardar Sarovar Project helps in preventing such pollution and thereby enriching the environment.

Health aspects

Human and cattle populations are important elements of the environment and improvement in their health is also considered to be a positive step towards environmental enrichment.

Wetlands & Sanctuaries benefited

Attempts have been made to extend the benefits of the Project to various sanctuaries by supplying water from the nearest canal segment. Wherever canal is not passing through such areas, water supply arrangements through pipelines on conservative basis have been made. Wild Ass Sanctuary in the desert of Kutch will have habitat conservation opportunity by receiving Narmada water. Part of Shoolpaneshwar sanctuary forms the catchment area of Narmada river. It was therefore studied in detail implementation of which improved habitat conditions and reduced biotic pressures. There has been suitable increase in some rare wildlife viz. Barking Deer, Four horned Antelope, Slothbear, Giant Squirrel, Grey Hornbill, Grey Jungle Fowl etc. Nal Sarovar, the unique wetland eco-system and world famous bird sanctuary is also going to be benefited by Narmada water which will be supplied through Saurashtra Branch Canal. With the availability of canal water round the year and even during droughts, there is likelihood of constant annual migration of birds promoting eco-tourism and thereby indirectly helping in livelihood of local people. Velavadar National Park of Black



Bucks (Antilope cervicapra) has also been benefited by various measures being taken in the park area. With great improvement in the grassland species, palatable grasses and herbs, Velavadar now holds one of the largest populations of Black Buck. Population of Lesser Florican (Sypheotides Indica) has increased many folds besides number of Wolfs. World's largest communal roost of wintering Harriers now migrates to Velavadar Park every year.

Regional Impacts of Narmada Water Supply

An independent Research Study (2003) conducted in the form of an undergraduate dissertation at School of Building Science and Technology was focused on the "Estimation of the Effect of Narmada Canal on Ahmedabad and Surrounding Areas". The study has reported that two existing reservoirs in Ahmedabad district having designed storages of 4.41 & 9.01 MCM which were dried up, have now received water due to Narmada Canal. Also 127 numbers of lakes in the district were filled up with Narmada water. Plausible impact on Nal Sarovar Bird Sanctuary is also noted. Concluding on the contribution of Narmada Main Canal to water supply for Ahmedabad City, the study revealed that by releasing around 1000 cubic feet per second of Narmada water in the river Sabarmati around 80 bore wells were not required to be operated any more. Instead around 96 million litres was extracted per day from French Wells in the bed of Sabarmati river which had been lying redundant for the past two years. This led to a saving of Rs. 125 thousand per bore well per month. On an individual level, a household will save upto 50% of its earlier expenditure. It also brought out the factual contribution of Narmada water saying "The main problem of this region being water quality, the Narmada water, if provided for along duration, will reduce that to a great extent alongwith the groundwater dependency in the region." Studying the impacts in terms of groundwater recharge it said "The groundwater scenario will not change for the confined aquifers, but through the river the unconfined aquifers get recharged. The other changes in the groundwater scenario will be mainly through the fields. The canals being lined will also help in diminishing the waterlogging problems." The study also mentions that Ahmedabad Urban Development Authority have planned two major development projects based on Narmada waters, which includes Sabarmati River Front Development Project and developing country's first ever 'Lake Grid' system encompassing 5-7 km radial peripheral area of the city.

CONCLUSIONS

Role of water in environmental enrichment can never be overemphasized. There are proven strong inter-linkages between water scarcity, poverty, environment and sustainable development. After all quality of life depends as much on healthy environment as on rising standard of living. Sustainable development can be achieved only with adequate attention to protection and in fact enrichment of environment. While evaluating any project from its environmental impact point of view, the state of environment in pre-project scenario (the baseline conditions) and the forecasted 'without project' scenario are no way less important than the forecasted 'with project' scenario. Sardar Sarovar Project, India, one of the most studied water resources development project, demonstrates the role of water in environmental enrichment. Proper project planning keeping in mind the plight of the people can certainly help in effectively rebutting the lopsided myopic worries. Before it is too late, let our heuristic knowledge and wisdom prevail and be inherited to the next generations along with a better living environment.



Disclaimer

To the extent possible, care has been taken to base the contents of the paper on official and published data about the Project. However, the views expressed in the paper are the individual views of the authors and not necessarily representing the organization they work for.

REFERENCES:

Dighe, Anuya (2003), An Estimate of the Effect of Narmada Canal on Ahmedabad and Surrounding Areas, Undergraduate Dissertation, School of Building Science & Technology, CEPT, Ahmedabad (Unpublished).

Gadkari, Anuradha S. (2002), *Water, Sanitation and Quality of Life: Strengthening Women's Role,* Water Resources Management – Crosscutting Issues (Ed.), METU Press, Ankara, Turkey, page 43 - 52.

Gujarat Ecology Commission (GEC) (1998), Study Report on Salinity, Vadodara.

Gujarat Water Supply & Sewerage Board (2005), *Geological and Geohydrological Status of Gujarat State (in vernacular), Report prepared jointly with UNICEF, p. 213.*

Halis Akder, A. (2002), *Water and Poverty*, Water Resources Management – Crosscutting Issues (Ed.), METU Press, Ankara, Turkey, page 34 - 42.

Sabnis, S. D. and Amin, J. V. (1992), *Eco Environmental Studies of Sardar Sarovar Environs*, Study Report, M.S. University, Vadodara.

Sardar Sarovar Narmada Nigam Ltd. (2000), *Meeting The Challenges of Development-Sardar Sarovar Project on River Narmada*, Information Booklet.

The Paris Declaration (1998), International Conference on Water and Sustainable Development, 19-21 March, 1998.

TIME (1994), DAMMING THE NARMADA - One of the Eight Modern Wonders Abuilding, January 24, 1994.

UNDP (1998), Integrating Human Rights with Sustainable Human Development, UNDP Policy Document.

UNDP (2000), *Human Development Report, Human Rights and Human Development*, Oxford University Press, New York.

United Nations (1986), Declaration on the Right to Development Adopted by General Assembly resolution 41/128 of 4 December 1986

[available at: http://www.unhchr.ch/html/menu3/b/74.htm]

United Nations (1998), Commission on Sustainable Development considers experience of states in fresh water management, *Report on the Sixth Session of the Commission on Sustainable Development*, July, 1998

[available at: http://ngls.tad.ch/english/ed/pubs/ed/csd6.txt]

United Nations (2000), Strengthening the United Nations for the 21st Century, the Millennium Forum Declaration and Agenda for Action

[available at: www.millenniumforum.org]

United Nations Conference on Environment and Development (UNCED) Declaration (1992), Rio de Janeiro, 3-14 June 1992

[available at: www.unep.org/Documents/Default.asp?DocumentID=78&ArticleID=1163] Wilson, H. H. (1978), *Rigveda Samhita*, Volume-IV, p. 333



World Commission on Water for the 21st Century (2000), *World Water Vision: Sovereignty – Summary of Principles and Proposals*, Report of the World Commission on Water for the 21st Century (London, Earthscan).

World Water Forum (2000) *Declaration of the Hegue on Water Security in the 21st Century* [available at: www.worldwaterforum.org /Ministerial/declaration.html]

www.sardarsarovardam.org (Official website of Sardar Sarovar Narmada Nigam Ltd., Gandhinagar, Gujarat State, India).



RESERVES AND ECONOMICAL EVALUATION OF CONSTRUCTION MATERIALS IN THE LAND OF AZERBAIJAN REPUBLIC

Tevfik ISMAILOV⁽¹⁾, Ruhangiz ISMAILOVA⁽²⁾

 (1)Suleyman Demirel University, Engineering-Architecture Faculty, Geological Engineering, Isparta, TURKEY
 (2)Azerbaycan Architecture and Construction University, Economy Department, Baku, AZERBAIJAN
 tevfik@mmf.sdu.edu.tr,ruhangiz@box.az

The Land of Azerbaijan Republic is located between Big and Little Kafkaz mountains from geomorphologic aspect. It has rich underground and upper ground natural resources.

There are more than 300 different construction mines which are occurred during geological eras. These natural resources are used in industry and plays important role of social lives of people who are living in Azerbaijan. 2.9 billion cubic meters of these natural resources are construction or related materials while 596 billion tons of these natural resources are raw material of cement. These natural resources are distributed for sub groups as 31.5 % clay, 23.3% sand and pebble, 19.5% wall rocks in the shape of saw, 7.6% covering rocks, 4.7 % construction sand, 3.1 % raw material of cement, 10.3 % different kinds of construction materials. Also, lime stone, marble, travertine, marly lime stone, gabbro, conglomerate, tuff, and porphyroid are the other important natural resources are investigated in Azerbaijan Republic.

In this paper, we searched costs and amounts of import and export of construction materials for Azerbaijan Republic during 1994-2003.

Keywords: Construction materials, Natural resources

1. INTRODUCTION

The surface area of the Republic of Azerbaijan land is 86.4 km². High Kafkas Mountains and smaller hills covered by land, mountain side and by hills. Some of the construction materials are used from ancient times for various reasons. For instance, in villages clay is used in making the walls of houses and in making roof tiles and house hold goods. Stone and cement making materials are also used in the country as social life standards are improved.

The exploration of construction materials in a greater magnitude started after beginning of concrete making. Afterwards the mining and geological engineers of Geological Exploration Institute of Azerbaijan have begun large scale investigation and discovered huge construction reserves all over the country. People also used cement raw materials and limestone slabs for making social and industrial buildings at a large scale in the construction of big cities.

The objective of these reserve studies is to establish the magnitude and quality of reserves. As a result of these studies more economical reserves can be determined.



For this reason the reports of committee of Geological Exploration Institute of Azerbaijan, geological investigation institute, and Institute of building materials are examined and their economical evaluation has been given.

2. AN ECONOMICAL EXAMINATION AND EVALUATION

According to the economical evaluation and investigation, the amount of reserves and their potential is given below.

There are more than 300 different construction mines which are occurred during geological eras. These natural resources are used in industry and plays important role of social lives of people who are living in Azerbaijan. 2.9 billion cubic meters of these natural resources are construction or related materials while 596 million tons of these natural resources are raw material of cement.

The natural resources are distributed for sub groups as 31.5 % clay, 23.3% sand and pebble, 19.5% wall rocks in the shape of saw, 7.6% covering rocks, 4.7 % construction sand, 3.1 % raw material of cement, 10.3 % different kinds of construction materials (lime stone, marble, travertine, marly lime stone, gabbro, conglomerate, tuff, and porphyroid).

Clay is found in the plain regions of the country at Kur –Aras valley. The clay deposit is extended over Apşeron peninsula in large quantities. Ninety four clay deposits are discovered which have a reserve potential of 191.6 million m³ 27.2% of which are in Kur- Aras valley, 16.8% of these reserves are in Apşeron peninsula. Today a total of 60.9 million m³ clay reserves come from 18 different clay fields in this region which used in the production of clayey materials. Bricks and roof tiles made from the clay are produced from various small factories in twenty cities in this region. In Ali Bayramli, industrial town clay materials taken from plain regions are used in big quantities at making water drain pipes. Sand stones and pebble stones are found in 69 different places which constitute a total of 1236.7 million m³ reserves. The biggest of these reserves are discovered at Velvelicay (35.4 million m³), Ismailli (34.9 million m³), and Akstafacay regions (32.3 million m³). Today, a total of 562.3 million m³ construction materials in great quantities come from 28 different fields in this region which are used in the production of various materials.

Cement raw materials are discovered at 10 places which has a total of 596.4 million tones. Quarries are opened up at these places according to the geology of the area. Today a quarry which has a total of 231.5 million tone reserve is operated in Apseron peninsula and it is used in production of cement at Karadag cement factory.

Building stones are discovered at 82 places which has a total of 649.5 million m³. These reserves are divided into two distinct groups according to their chemistry and structural properties. These groups are;

- 1. Raw stones,
- 2. Cladding stones.



Raw stones are discovered at 58 places which has a total of 451.7 million m³. 7 of these reserves have 312.8 million m³ reserves. These reserves situated at Şahbulak, Güzdek, Karadağ, Taş-Salahlı, Agdere, Qoviyatyar, and Dilogar towns.

Cladding stones and limestones are discovered at 22 places which has a total of 198.6 million m³. The stones taken from 5 quarries are used in large quantities in making lime, karstic lime, agricultural lime, animal feeding lime and painting building inside walls. The materials taken from 3 quarries are used in making crushed stone and masonry stone. These reserves are situated at Apserou peninsula, Gence-kazak, Yukari Karabag, mountainous regions of Şilvan valley and Kuba-Hacmaz economical regions. Metamorphosed limestone marbles are situated at Yukari Karabag, Nahcivan, Granogiorit, Gence-Kazak. Tuff stones and tuffy sandstones are situated at Nahcivan regions.

Building sands are discovered at 9 places in Apseron peninsula which has a total of 32.7 million m^3 . This reserve constitutes 48.4% of the country's total reserves. 16 quarries sites of total reserve 80.6 million m^3 are discovered in all country. The largest of this reserve is discovered at Sihlar village which is at Hazar sea shore.

As a result of this study, the discovered industrial raw material reserves in the country are tabulated according to their situation by cities (towns) and their quantities are given in Table 1.

| The Economic Region of Republic | Weight % |
|---------------------------------|----------|
| Total Azerbaijan | 100 |
| Apseron | 18.6 |
| Kuba-Hacmac | 6.4 |
| Daglik Sirvan | 4.3 |
| Seki- Zakatala | 9.5 |
| Merkezi-Ovalik | 12.7 |
| Genc-Kazak | 14.6 |
| Yukari-Karabag | 20.6 |
| Kelbecar-Lacin | 5.1 |
| Lenkoran-Astara | 1.4 |
| Nahcivan | 6.8 |

Table 1. The distribution of raw materials according to regions of Azerbaijan

The largest quantity of construction material is in Yukari Karabag and Apseron regions as it is seen in Table 1. Lenkoran-Astara deposit has the smallest reserve potential.



3. THE ECONOMICAL EVALUATION OF RESERVES, AMOUNTS OF IMPORT AND EXPORT OF TRAVERTINE MINES OF AZERBAIJAN

Four travertine mines have been discovered in the land of Azerbaijan Republic according to Geology Committee reports 1968-1972. The travertine mines in Azerbaijan had become during med Quaternary.

Kubatlı travertine mine has 2457000 m^3 reserves which have not been used yet. Buzdov mine is in the Nahcivan region. This mine has 8263000 m^3 reserves and has not been used. Sahtahti travertine mine is in Nahcivan region and has 7300000 m^3 reserves. Karadas mine is in Nahcivan region and has 1750000 m^3 reserves. Today this mine is not performed. All the mines mentioned above have been closed due to not being established factories and difficulty of transportation

Table 2. The amount and worth with percentage of raw travertine and marble had been imported between 1994 and 2003

| Year | Amount | Worth | Amount | Worth | Country |
|------|---------|---------------|-----------|--------|----------------------|
| | (tons) | (thousands of | (%) | (%) | |
| | | dollars) | | | |
| 1994 | 220.86 | 78.7 | 27.166 | 22.37 | Iran |
| | | | 72.833 | 77.62 | Kyrgyzstan |
| | | | 91.96 | 69.296 | Iran |
| | | | 6.31 | 25.08 | Kyrgyzstan |
| 1995 | 902.55 | 147.18 | 0.88 | 2.84 | Ukraine |
| | | | 0.775 | 1.41 | Turkey |
| | | | 0.060 | 1.35 | United Arab Emirates |
| | | | 84.238 | 64.33 | Iran |
| 1996 | 1368.31 | 199.68 | 11.498 | 31.926 | Turkey |
| | | | 4,239 | 3.11 | Russia |
| | | | 0.0000023 | 0.62 | United Arab Emirates |
| | | | 56.05 | 10.82 | Iran |
| | | | 19.31 | 82.73 | Turkey |
| | | | 14.59 | 2.05 | Russia |
| 1997 | 2352.86 | 934.88 | 5.202 | 1.296 | Ukraine |
| | | | 3.078 | 2.059 | United Arab Emirates |
| | | | 1.750 | 0.963 | Greece |
| | | | 47.13 | 86.0 | Turkey |
| 1998 | 3777.8 | 1799.0 | 42.65 | 11.18 | Iran |
| | | | 10.06 | 2.568 | Russia |
| | | | 0.1455 | 0.172 | Italy |



Table 2. Cont.

| | | | 57.56 | 52.09 | Iran |
|------|--------|--------|----------------------|--------|---------|
| 1999 | 3588.1 | 387.2 | 32.46 | 16.83 | Russia |
| | | | 9.969 | 31.06 | Turkey |
| | | | 1.1×10^{-7} | 0.007 | Spain |
| | | | 55.98 | 56.687 | Iran |
| | | | 25.12 | 16.967 | Russia |
| | | | 15.41 | 22.56 | Turkey |
| 2000 | 5468.1 | 470.3 | 2.209 | 0.489 | Georgia |
| | | | 1.09 | 1.44 | Ukraine |
| | | | 0.179 | 1.70 | China |
| | | | 0.0018 | 0.106 | Italy |
| | | | 58.8 | 40.30 | Russia |
| 2001 | 973.7 | 64.0 | 20.81 | 35.15 | Iran |
| | | | 20.39 | 24.55 | Ukraine |
| 2002 | 209 | 17.8 | 66.98 | 62.92 | Iran |
| | | | 33.02 | 37.08 | Ukraine |
| | | | 65.68 | 50.05 | Iran |
| | | | 12.24 | 7.60 | Russia |
| 2003 | 9374.7 | 1130.6 | 22.10 | 41.69 | Turkey |
| | | | 0.0750 | 0.608 | India |
| | | | 0.0250 | 0.052 | China |

Azerbaijan's economy was in bad shape in the first years of independence like other members of former Soviet Union. Azerbaijan started to improve its economy after 1994. New investments come from foreign investors. Some factories are privatized and after maintenance are started to production such as Garadag cement factory. Others signed agreements with foreign investors to build new factories.

New subways, underground highways, hotels and entertainment centers are started to build in large cities. Azerbaijan Republic imported different construction materials such as marble and travertine which have a large usage in construction addition to its own resources. Today, Azerbaijan's travertine mines are not operated. Some samples of these mines are displayed in International Izmir Fair in 2005. Turkish investors interested in travertine mines in Nahcivan. These investors are thinking to sign some agreements to use related mines. If this happens, both sides will have economic advantages. Products of this mine will have areas of use in Nahcivan and cities located in eastern Turkey. Azerbaijan buys raw marble and also products of marble and travertine from Russia, Ukraine, Kazakhstan, Kyrgyzstan, Iran, Turkey, Italy, and Spain. The amounts and worth of imported travertine are listed in the Tables 2 to 3 below for different years and different countries.



| Table 3. Amount and worth with | i percentage of | processed | travertine | and | marble | and |
|-----------------------------------|-----------------|------------|------------|-----|--------|-----|
| countries where it had been impor | ted between 19 | 99 and 200 | 3 | | | |

| Year | Amount | Worth | Amount | Worth | Country |
|------|--------|---------------|--------|-------|---------------|
| | (tons) | (thousands of | (%) | (%) | |
| | | dollars) | | | |
| | | | 61.24 | 13.72 | Iran |
| | | | 34.59 | 81.29 | Turkey |
| | | | 29.33 | 2.64 | Russia |
| 1999 | 2853.7 | 1086.5 | 0.59 | 0.614 | Italy |
| | | | 0.395 | 0.230 | U. Arab Emir. |
| | | | 0.245 | 1.47 | U. Kingdom |
| | | | 31.28 | 73.5 | Turkey |
| | | | 32.02 | 5.75 | Iran |
| 2000 | 409.2 | 2106 | 21.15 | 11.96 | Russia |
| | | | 8.79 | 3.98 | Kazakhstan |
| | | | 6.72 | 4.89 | Italy |
| | | | 53.31 | 25.02 | Russia |
| 2001 | 1636.0 | 216.2 | 37.57 | 30.20 | Iran |
| | | | 8.22 | 44.54 | Turkey |
| | | | 0.90 | 0.23 | Italy |
| | | | 39.40 | 37.80 | Iran |
| 2002 | 2129.3 | 209.5 | 33.85 | 42.58 | Turkey |
| | | | 26.74 | 19.62 | Russia |
| | | | 44.52 | 55.85 | Turkey |
| 2003 | 2556.7 | 244.2 | 44.25 | 35.29 | Iran |
| | | | 7.77 | 5.97 | Russia |
| | | | 3.45 | 2.90 | Italy |

Republic of Azerbaijan had imported 28236.865 tons of raw travertine and marble between 1994 and 2003. Government paid 5232.57 thousands of dollars for this material.

Tables 4 and 5 give the amounts of trade of raw materials and products of travertine and marbles for different countries in order, respectively.

| | | | | | Worth | Worth |
|-------------|-------|---------------|-----------|------------|---------------|------------|
| Year | No. | Country | Amount | Percentage | (thousands of | Percentage |
| | | | (tons) | (%) | dollars) | (%) |
| | 1 | Iran | 16587.49 | 58.74 | 1620.20 | 30.96 |
| | 2 | Turkey | 5671.985 | 20.08 | 3087.30 | 59.00 |
| 3 4 5 | 3 | Russia | 5092.01 | 17.86 | 328.73 | 6.30 |
| | 4 | Ukraine | 457.40 | 1.62 | 45.40 | 0.87 |
| | 5 | Kyrgyzstan | 217.86 | 0.77 | 98.01 | 1.87 |
| | 6 | Georgia | 120.80 | 0.43 | 2.30 | 0.050 |
| 1994- | 7 | U. Arab Emir. | 73.30 | 0.26 | 22.49 | 0.430 |
| 2003 | 8 | Greece | 41.19 | 0.15 | 9.01 | 0.1720 |
| | 9 | China | 12.20 | 0.04 | 8.60 | 0.1640 |
| | 10 | India | 7.00 | 0.03 | 6.90 | 0.1310 |
| | 11 | Italy | 5.60 | 0.02 | 3.60 | 0.0700 |
| | 12 | Spain | 0.04 | 0.00014 | 0.03 | 0.00061 |
| | Total | | 28236.865 | 100% | 5232.57 | 100% |



The total amount of treated travertine and marble products had been imported by The Republic of Azerbaijan between 1999 and 2003 is 9584.9 tons. The government paid total of 3862.4 thousand dollars.

| | | | | | Worth | Worth |
|-------|-------|---------------|------------|------------|---------------|--------------|
| Year | No. | Country | Amount | Percentage | (thousands of | Percentage |
| | | | (tons) (%) | | dollars) | (%) |
| | 1 | Iran | 4464 | 46.57 | 1891.8 | 49 |
| | 2 | Turkey | 3108.4 | 32.43 | 1359.8 | 35.2 14.6 |
| | 3 | Russia | 1810.7 | 18.90 | 563.7 | |
| 1999- | 4 | Italy | 147.5 | 1.53 | 24.9 | 0.64 |
| 2003 | 5 | Kazakhstan | 36.0 | 0.38 | 8.4 | 0.21 |
| | 6 | U. Arab Emir. | 11.3 | 0.12 | 2.5 | 0.064 |
| | 7 | United | 7 | 0.074 | 11,3 | 0.29 |
| | | Kingdom | | | | |
| | Total | | 9584.9 | 100% | 3862,4 | 100% |

Table 5. Trade for different countries in order (products of travertine and marbles)

Azerbaijan Republic exported raw marble and travertine mainly to Russia and limited amount to Iran. It has exported 3766.24 tons (worth of 35.96 thousand of dollars) of marble and travertine to Russia in 1994. In 1995, 330.61 tons of marble and travertine are exported to Russia and Iran. There is no export of marble and travertine in 1996. Total 50 thousands of dollars worth of 120 tons of marble and travertine, 83.3% to Russia, 16.7% to Iran, have been exported in 1997. In 2001, 0.3 tons of marble and travertine products, worth of 0.2 thousand of dollars, are exported to Turkey. In 2002, 14.1 tons of products are exported to Russia for 1.6 thousands of dollars. In 2003, 0.9 tons of products are exported to Russia for one thousand of dollar.

4. CONCLUSIONS

The following findings are given as a result of this work.

- 1. It was very important that the discovery of great reserve potential of construction materials in republic of Azerbaijan has increased economic development of the country.
- 2. Construction materials which are discovered at scattered in various places of the country creates difficulty in them at industrially developed cities due to transportation costs.
- 3. The largest construction material reserves in Yukari Karabag 20.5 of total reserves and Apseron regions 18.6 of total reserves Lenkaran- Astara deposit has the smallest reserve potential of 1.4 of total reserves.
- 4. Travertine and marble are used in floors, walls, stairs, bathrooms, and counter tops of residential buildings. Also they are used in the design of cemetery stones, architectural monuments, underground passes underground metro stations.
- 5. The foreign investors and entry of foreign capital are needed for Buzdov, Sahtahti, Karadas travertine quarry operations with large capacity of machinery.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus

- 6. Azerbaijan imported marble and travertine from Russia, Iran and Turkey since 1994, due to the help of economic aids of these countries.
- 7. Azerbaijan marble and travertine imports increased steadily from 1994 up to present accordingly1994, 220.86 tons, 4 times more in 1995, 6 times more in 1996, 10 times more in 1997, 17 times more in 1998, 16 times more in 1999, 24 times more in 2000, 4 times more in 2001, 1 time more in 2002 and 42 times more in 2003.
- 8. The total amount of 28236.865 tons raw marble and travertine (worth of 5232.57 thousands of dollars) is imported during 1994-2003. The percentages of imports were: 58.74 % from Iran, 20.08% from Turkey and %17.86 from Russia.
- 9. 3862.4 thousands of dollars of worth 9584.9 tons processed marble and travertine is imported during 1999-2003. The percentages of imports were: 46.57 % from Iran, 32.43% from Turkey and %18.90 from Russia.
- 10. The total amount of 4336.81 tons marble and travertine sales (worth of 167.29 thousands of dollars) is exported in 1994, 1995, 1997 and 2000. The percentage of export sales were: 99.28 % from Russia, 0.72 % from Iran.
- 11. The total amount of 15.3 tons processed marble and travertine sales (worth of 2.8 thousands of dollars) is exported in 2001, 2002, and 2003. The percentage of export sales were: 92 % from Russia, 5.88% other countries in Russia, %1.96 from Turkey.

REFERENCES:

- 1. The reports of Geological Committee of Azerbaijan, 1949-2000, Baku.
- 2. Azerbaijan travertine mines Geological Committee of Azerbaijan, 1968-1972, Baku.
- 3. Azerbaijan Statistical News Journal, 2004, Baku.
- 4. Sekinskizm. The building material reserves of Republic of Azerbaijan, 1989, Baku.
- 5. Kazak MM. The e
- 6. conomic analysis of building materials and structures, 2004, Moscov.



EVALUATION OF THE YACHT SLIPWAY PLANTS IN TERMS OF ENVIRONMENTAL PROBLEMS AND SOLUTIONS: A CASE STUDY OF FETHIYE-TURKIYE

Remzi KARAGÜZEL¹, Mahmut MUTLUTÜRK¹ Raşit ALTINDAĞ² & Rafet KISTIR³

¹ S.D.U. Engineering and Arch. Faculty, Department of Geology Engineering,Isparta/TURKEY ² S.D.U. Engineering and Arch. Faculty, Department of Mining Engineering Isparta/ TURKEY ³ S.D.U. Engineering and Arch. Faculty, Department of Architecture, Isparta/TURKEY kguzel@mmf.sdu.edu.tr

There are many yacht care- reparation- production plants (slipway plants) providing services especially for yacht tourism throughout the Mediterranean coast in Türkiye. These plants, very beneficial for the national economy and located in popular tourism centre, entertain environmental risks along with them on account of both their locations and deficiencies of infrastructure. These environmental problems can be classified as soil, water and air pollution, noise and image pollution what is more yacht security, labourer health and danger of fire.

It seems obligatory that the available plants should be evaluated in terms of environmental effects and some precautions should be taken for the solutions of likely problems. These precautions may sometimes require applicable amendment process and sometimes construction of modern plants in a new region.

In this study, the ideas regarding the identification of environmental problems stemming from Fethiye Yacht Slipway Plants and solutions for them are stated.

It has been stated in the research that Fethiye slipway plants are extremely primitive not only for they cause noise and image pollution but also there is heavy metal pollution on soil and this may be a crucial indicator for water pollution as well. The location and topographic characteristics of the slipway can not give way to applicable in-situ modernization. Karaot region has been decided out of many alternatives for the new modern plants. It is compulsory that the plant units to be constructed in the defined region should be prepared as a project applying current technology and all kinds of waste (solid, liquid, gas) should be taken under control and eliminated. In accordance with the detailed geological-hydrogeological research conducted in the region some suggestions for the constructions of the plant units and prevention of the likely environmental problems have been put forward.



1. INTRODUCTION

In Türkiye, of which all three sides are surrounded by sea, ship, ferry, steamboat, boat, yacht, vessel and such marine vehicles are very important in transport. It is hard to say that the environmental effects of these vehicles are taken into consideration seriously neither while they are under way nor when they are at the harbour, on the marina, on the slipway, at the care and reparation places. Especially, the spillways furnishing services for yachts and vessels both nationally and internationally throughout the coast-line of Mediterranean and Aegean Sea with a high tourism potential have been providing very important inputs for the national economy. However, it has been conceived that the slipway places determined without considering the scientific criteria along with the primitive operating methods cause severe environmental damages. Among the groundwater pollution in the alluvial aquifers of narrow coastline and sea pollution come in the front ranks.

During the EU adaptation process, as in the case of many other issues, environmental effects of available yacht slipway, care, reparation and production plants need to be evaluated. In this evaluation, taking precautions against the likely problems seems to be obligatory. These precautions may sometimes require applicable amendment process and sometimes construction of modern plants in a new region. In determining the location of slipway plants, construction and operating process along with the environmental effects seen after operating need to be taken into consideration.

Before discussing the environmental effects of the available plants and precautions to be taken on the Fethiye sample, it is useful to state the close definitions of the actions carried out within the activity and plant units.

2. ACTIVITIES PERFORMED IN SLIPWAYS

The activity units performed in yacht slipway-care, reparation and supply plants can be divided into five groups.

The units assumed to be performed in the sea are the parking areas used as waiting places by the yachts after they are lowered to the sea and for the purpose of being pulled towards the shore. These are structures like breakwater.

The units assumed to be performed between the sea and the land; the units between the sea and the land are vessel pulling ramp, mortise-chisels and transport roads. During pulling and shipping as there is no care and reparation process, no negative effect to the environment is expected. However, before the vessels are fixed on to the parking area, the mussels and mosses on their underwater body are got rid of, washed and even the bilge is cleaned. The units assumed to be performed on land, in open air; these units are open parking areas, these places are only to be used for parking purposes. Hence, no bad effect to the environment is expected. However, when the likely damages of the wastes as oil and fuel poured out from the yachts while they are waiting are taken into consideration, the leak proof characteristic of the base is important.



Open production-care-reparation places are areas where solid and liquid wastes may occur during the processes to be applied. At this point, in order to gather the solid and liquid wastes and to get rid of them, a suitable surface system of drainage is crucial.

The units assumed to be performed on land, in a close place; these units are divided into two main groups as well. The first group includes administrative building, guest house, social plants and other vital places, while the second group includes factory, dye-house, service depot and such structures. The vital places seem to be no bad effects to the environment.

There is no emergence of liquid waste, because wood, fibre, PVC, and metal materials are used in the factories. Solid wastes on the other hand need to be gathered for recycling or stored in landfill. Newly produced, cared and repaired vessels need to be dyed. Besides the technical precautions taken in the dye-houses, all dye stuff need to be environment friendly. Moreover, ISO standards need to be abided by. During dying process; labourers' health, preparation and fulfilment of emergent activity plans shall be taken into account.

Other plants; other plants are those such as generator, refining, storage tank, fire station that render assistance the activities of the plants. Impermeable bases and drainages of all these structures need to be carried out according to their features.

Recreation areas; these areas are related to environmental system. Some active and passive areas such as walking and relaxation places will be created all along the unoccupied places, moreover these plants and the environment will be formed as one unit.

As an example study for the analyzing the environmental effects of slipway care-reparation and production plant that is already operating, Fethiye plants, which have considerable potential in our country, have been chosen. The emergent precautions to be taken at those plants of which environmental damages have been searched and the activities for modern plants in the region have been described in detail for the purpose of their becoming a guide for other plants.

3. CURRENT CONDITION OF THE FETHIYE SLIPWAY PLANTS AND ENVIRONMENTAL PROBLEMS

Throughout the slipway places, the activities having commenced in an amateurish way in 1980s and providing inputs for the national economy at present have recently become an important issue. Nevertheless, it can be clearly seen that yacht production-care-reparation plants haven't been included in the urban plans. Plants willing to furnish services in the sector have been trying to continue their activities in unsuitable conditions regarding the environment and their own working locations. Especially the fact that there is no plant to furnish service in international standards is an undesirable case in terms of both foreign currency and the esteem of our country.



The activities performed in current yacht care-reparation areas are in the form of annual care fulfilled each year and general care fulfilled bi yearly. During the annual and general care, firstly seashells and similar substances on the lower part of the vessel are scraped off with the help of steel ropes and poles. In this process, the shells of sea animals and some dyestuff are scraped. Afterwards, in accordance with the care type, emery, paste, coating and dying processes take place. When the inner parts of the vessel are being cleaned, wastes called bilge accumulated on the ground need to be washed and released. Once all these processes have been completed, its last dye should be carried out and then the vessel should be landed on the sea again. All the wastes emerging after cleaning and dying processes are left on the natural ground so that they partly filter into underground and partly flow into the sea.

The study of the soil pollution caused by the plants in Karagözler region (Figure 1) within the town has been found very interesting with regard to the issue's coming to light and new plants being considered. It has been found that as a result of chemical analyses of eight soil samples provided from an excavation research in ACME-Canada laboratories (ICP-MS method), concentrations of Cu, Pb, Zn, Ag, Ni, Co, Mn, As, Cd, Ti, Al, Hg and Se are higher (Table.1). In consequence, it is natural that an individual can expect soil heavy metal pollution stemming from plants that have been going on their activities for over 25 years, also from groundwater and sea water as well.

The fact that the available plants in the town (Karagözler) cause noise and image pollution in addition to soil, water and air pollution, entertains such environmental risks as yacht security, labourer health and security. This situation indicates that the current plants will not be able to continue their activities within the region and new modern plants are obligatory.



Figure 1. A view from the current plants (Karagözler).



| Sample Number | Cu (ppm) | Pb (ppm) | Zn (ppm) | Ag (ppb) | Ni (ppm) | Co (ppm) | Mn (ppm) | As (ppm) | Cd (ppm) | Ti (%) | Al (%) | Hg (ppb) | Se (ppm) |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-----------|-----------|-------------|-------------|
| G-1 | 1.86 | 2.54 | 49.6 | 11 | 6.5 | 4.4 | 577 | 0.3 | 0.01 | 0.128 | 0.99 | <5 | <0.1 |
| 1-1 | 2597.66 | 508.33 | 2098.4 | 187 | 2078.4 | 102.8 | 916 | 6.1 | 1.65 | 0.017 | 0.58 | 1762 | 0.4 |
| 2-1 | 9756.26 | 1497.07 | 4165.8 | 497 | 1501.7 | 84.7 | 778 | 5.7 | 1.01 | 0.016 | 0.62 | 3402 | 0.3 |
| 3-1 | 3033.18 | 388.57 | 3492.5 | 366 | 619.5 | 36.1 | 1004 | 10.0 | 0.81 | 0.043 | 0.46 | 7051 | 0.2 |

Table 1. The results of chemical analyses of the taken soil samples.

4. ACTIVITIES FOR MODERN SLIPWAY PLANTS IN FETHIYE REGION

4. 1. Selection of Location

Totally nine alternative areas have been selected by Fethiye Municipality, which decided to close the slipway plants within the town in 1999, with the consideration of various criteria for environmental friendly modern new plants (Figure 2).

Among the alternative areas Karaot district has been specified as the most suitable location for its effective characteristics stated below.

- Big enough to fill a long term need,
- The ownership belonging to the Treasury,
- Convenience of its topographic structure,
- Remote to residential areas close to the highway,
- In a good central position so as to fill the region's need,
- At the point equilibrating the socio-economic balance in the regional scale

4.2. The Position of the Specified Location for the Project

Access to the specified location is fulfilled by turning to south approximately at the 10. km of the Fethiye Göcek number 6 highway and going straight ahead 1.5 km. on that way.

In the western part of the activity area, there is a reedy and bushy field growing up in Akgöl coastal marshes, in the north there exists a heavily forested area mostly covered with needle leaves, within the location and in the eastern part there are partly bushes and partly dry agricultural fields. The quota of the location on which activity units will be constructed is a flat area changing between 0.50 - 2.5 m. The heights around the activity location are Karaot hill (44 m), Karanlık hill (65 m), Meteriz breach (144.9 m) and Küçük Katrancı (33 m).



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



Figure 2. Location map.

5. GEOLOGY AND HYDROGEOLOGY OF THE SELECTED LOCATION

Knowing the geological and hydrogeological characteristics of the location seems essential so as to discuss the feasibility of the activities on that location as well as the effects of the local water sources, to Akgöl close to the area and to deeply consider the plant units and the precautions taken against environmental problems.

5.1. Geology of Study Area and its Surroundings

On the study area, the Marmaris peridotites mostly seen throughout the west Mediterranean coastal line make up the dominant lithology. There are alluvial precipitated areas formed with the effects of rivers, lakes and seas on the Marmaris peridotite (Figure 3).




Figure 3. Geological map of the study area and its near surroundings (Şenel, 1997).

Since the contemplated plants will be constructed on these alluvial units, macro characteristics of the ground have been determined by using drills at four different points (Figure 4). In the boreholes whose locations are signed in the maps in Figure 4 and whose depths change between 1.50- 3.50 m there take place consecutively 20-50 cm vegetable soil, brownish sandy clay up to 1.00 m. and after this depth there are completely green sandy, gravely clay, argillaceous sand and gravely levels (Figure 5). On the sandy levels, water is seen to run out of the surface. The well number 3 has absorbed clay until 2.40 m, after this depth water on the level of gravely sand has risen to 87 cm.



5.2. Hydrology

In the study area the average annual precipitation has been specified as 808 mm. The calculations done according to Thornthwaite method have already indicated that the potential evaporation (Etp) is 1446 mm whereas the real evaporation (Etr) is 431.6 mm.

In a basin as large as about 1.4 km² there are totally 1,147,059 m³ precipitations. Approximately 612,332 m³ of this fall evaporates, the remaining 534,727 m³ water flows through dry rivers or floods on the surface into Akgöl and Mediterranean sea depending on territory slope while some of it flows into groundwater recharge on rocky terrain through fractures and cracks, on alluvial terrain through the gaps between the pieces.

5.3. Surface Waters

5.3.1. Streams

There is not a stream which is constantly feeding the basin. Dry streams indicated as dashed lines on geology maps (Figure 3) start flowing in rainy seasons. However, the flow rates of these dry streams haven not been measured so far. Moreover, some water is supplied for a part of the activity area and for the agricultural areas in the south from Kargi stream, which is in the eastern part of the research area. The fact that the activity is affected badly by overflowing of Kargi stream is out of question.

5.3.2. Akgöl Lake

The surface square of Akgöl, which is in the western part of the activity area, was calculated by making use of the measurements in July 2005 as nearly 86,400 m² while the size of the swampy area around it was calculated as 227,874 m². The deepest point of the lake was measured as -1.59 cm and since the depth suddenly increases beginning from the shore on the bathymetry map, average depth of water size has been accepted to be 65 cm (Figure 6). Water volume of the lake has already been determined as 56,160 m³. Since there are reeds in the region considered as swamp, when the difficulties in determining the sideline of the swamp and lake shore are taken into account, water size of the lake increases much more. The fact that water level of the lake is the same as sea level and there is no channel for surface flow (Figure 6) indicates the underground flowing from coastal sands. During the times when the lake is fed a lot and the level is high there appears a flowing from the lake to the sea.



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



Figure 4. Engineering and hydrogeological map of the selected area (Karagüzel & Mutlutürk, 2005)



Figure 5. Sections of the boreholes (Karagüzel & Mutlutürk, 2005).





Figure 6. Akgöl bathymetry map (Karagüzel & Mutlutürk, 2005).

A flowing channel is clear on the bathymetry map. During summer when the evaporation is high, flowing is seen in reverse direction. As a matter of fact, in the field research conducted on 25 July 2005 it was found that water level of the lake is lesser than sea level and there is a flowing from sea towards the lake. The water of the lake, which has a connection to the sea, is salty.

5.4. Hydrogeology

5.4.1 Hydrogeological Characteristics of Lithological Units

In this section, water bearing (being aquifer) characteristics of the geological (lithological) units are evaluated.



5.4.1.1. Peridotites

The unit described as the Marmaris peridotite and charted on the heights around the activity area is made up of serpentine ultramafic rocks (Çapan, 1980). These rocks unit constituting generally impermeable border conditions may consist of some water in its faults and cracks. These waters in patches can run out in the shape of seasonal sources or feed the alluvial aquifers in lateral position (Doyuran et all. 1999).

Fractures and cracks may give way to the water's gaining pressure in the regions including groundwater. In A-1 artesian well whose location is shown in Figure 4, the peridotites under the alluvial cover as thick as 20 m this well started working in the positive artesian conditions (Based on the information obtained from local community in the area).

5.4.1.2 Alluvium

Alluviums mapped in the study area and surroundings are formed by the layers with clay, silt, sand, gravel and other combinations lining up consecutively.

Those alluviums common in Mediterranean coastal line are lateral transitive altogether with coastal sands and sand cone on hillsides as well as slope wash. They also have hydraulic connections (Doyuran et all. 1999) and are described as aquifers.

In the activity area, there is a deep well inhibiting all thickness of the alluvium. However, from the artesian well (A-1) whose depth is nearly 80 m in the eastern border of the activity area water flows through the entrance of the well with 5 l/s flowing rate as a positive artesian condition. On the other hand, no positive artesian condition has been seen in the number T-6 pump well this is approximately 170 m in the northern part of this well and with the depth of 85 m. In T-6 number pump well piezometric water level has already been measured as 1.35 m. The alluvial thickness in both wells is nearly 20 m and the possibility of an increase in the water pressure is high due to the slopes of the impermeable clay layers in alluviums.

Groundwater can be obtained from shallow wells of 6-7 m by using water pumps within the activity area and its surroundings.



5.4.2. The Map of Groundwater Level

In June 2005, levels were measured in the new shallow wells in the area (Figure 4) and in available pump wells in order to determine the levels and flowing direction of the groundwater in the activity area. On the map of groundwater level it is clearly seen that beginning from the shore groundwater quota reaches 1.5 m on hillsides. When the flowing directions are taken into consideration in the region, it has been found that groundwater is fed from the north and northeast parts while it runs out from the eastern part of the activity area into the Mediterranean Sea and from the northern and western parts into Akgöl. The fact that the flow direction of the groundwater is from northeast to southwest indicates that there is a lateral feeding from the stream in the delta region where Kargi stream bears to sea.

6. WATER CHEMISTRY AND QUALITY

In Karaot district, where the complex of yacht slipway care and supply has been planned, groundwater (from shallow and deep wells) and surface (lake) samples were taken from totally 5 points shown in the Figure 4 in order to determine the quality of lake and groundwater prior to the activity. At the time of sample process, EC, temperature and TDS, pH were measured on the field.

Chemical analyses of the water samples have been conducted and the collective results are given in Table 2.

Şahinci (1991) suggests that ultrabasic rocks (peridotite, serpentine, etc.) are rich in such elements as silica, magnesium, iron, calcium and the waters running out from those rocks are rich in magnesium and iron. When Table 2 and Figure 3 is examined, high Cl, Fe, Hg, K, Mg, Na, Si proves that groundwater in the region are fed by the rocks.



| Sample Number | Cl (ppm) | Fe (ppb) | Hg (ppb) | K (ppb) | Mg (ppb) | Na (ppb) | Si (ppb) |
|------------------|-------------|-------------|-------------|------------|-------------|-------------|-------------|
| K-6 | 248 | 20 | 75.7 | 2002 | 52594 | 9006 | 8379 |
| A-1 | 230 | 23 | 100.4 | 511 | 58578 | 4415 | 13628 |
| Lake | 5786 | <1000 | 2887.2 | 113816 | 605435 | 3651652 | 26567 |
| T-2 | 298 | 124 | 96 | 910 | 56583 | 9121 | 14857 |
| T-4 | 322 | 267 | 138.7 | 649 | 55291 | 5192 | 13136 |
| Standard | 2 | 246 | 0.1 | 91 | <50 | <50 | 170 |

Table 2. The results of chemical analyses of the water samples.

That the high HCO_3 concentration (300- 400 mg/l) is higher than those in ultrabasic rocks (150-200 mg/l) indicates that there is another feeding from rocks with carbonate. As the rocks with carbonate do not come up in the basin, it can be said that an underground feeding takes place. The fact that there is artesian condition in deep wells supports the thesis of underground feeding.

In the classification done according to Piper, Akgöl's water with alkalinity, carbonate alkalinity, NaCl, NaSO₄ and KCl is believed to be in the sea and very salty waters group (Figure 6). That anion, cation and all the other element concentration are higher in the water sample from taken the lake than in groundwater indicates both the lake is not fresh water and sea water mixes with it. According to the chemical analyses carried out in ACME laboratories large quantity of anion, cation and heavy metal concentration exceeds the standard values (Table 2). This situation can be explained with ion concentration density as a result of sea water and evaporation. In addition to that, it is in harmony with Piper diagram. However, while Hg concentration is in the level of (2887.2 ppb) in the lake water, and in the groundwater Hg concentration values range 75.7-138.7.

Since there is no pollution such as industrial establishment, agricultural activities within the basin, Hg concentration with the toxic effect is thought provoking. Although there is no quicksilver source in near surroundings of the basin, ultramafic rocks and according to a geology map (Şenel, 1997), basic volcanic rocks on the bases of periodites constitute suitable geological environments for quicksilver sources (Gökçe, 1995). When the regional geological structure is taken into consideration, Hg concentration needs to be completely geological. As anthropogenic origin, firstly Fethiye-Muğla highway, going through north of the research area, recurs to the mind. Analyzing the origin of quicksilver concentration is another research topic. According to the findings at this stage of the research, consumption of groundwater as drinking water is assumed to be harmful.



These chemical analyses will also be used for the comparison of pollution amounts before the plants are constructed in the region.

7. PLANTS' APPLICATION TO THE REGION

The plant units have been applied to the considering the geological, hydrological and hydrogeological characteristics as well as the topographic features of the activity area (Figure 7). In this application process, the following determining factors are seen.

Projected field of the plants is on an alluvial base consecutively made up of clay, sand and gravelly sand. It is necessary that in the course of the plant units getting projected, they are examined geotechnical in detail. Base conditions and the flowing directions of groundwater need to be considered seriously.

According to the groundwater level map, the feeding of these waters is from north and northeast while their running out (flowing direction) is towards the Mediterranean and Akgöl. When the size of the water gathering basin, geological structure and pressure wells of the river basin are taken into consideration, it has been concluded that the Akgöl Lake is also fed by aquifer and neighbouring basins. The fact that there is an impermeable clay layer in the surface of the wells opened in the plant area indicates that there is no feeding from surface and imperviousness precautions taken to preserve the water sources in that area do not effect the feeding of groundwater, moreover there is no reduction in Akgöl's feeding.



Figure 7. Draft settlement plan of the plants projected in Karaot district. That Hg concentration has already been seen in lake water and water analyses in alluvial areas indicate the impossibility of using these waters as drinking water.



Even though the clay layer as thick as 1.0-1.5 m at the top of the activity area enables the natural impermeability, some precautions should be taken against groundwater and surface water (sea and Akgöl) pollution stemming from the activities in that field. At this place, drainage activities, collection and purification of surface and waste water is compulsory. Observation wells are essential to monitor the quality of groundwater.

In the region, uncontrolled wells should not be allowed and as a result of sand dune movements, Akgöl's closed surface channel with the Mediterranean should be open again so as not to damage the ecological balance of Akgöl's feeding and water level, and to provide the domestic water for plants.

8. CONCLUSIONS

According to the results of soil analyses conducted throughout the region with available plants in Fethiye, the exceeding heavy metal pollution on soil indicates how risky slipway plants can be throughout the country. In the event of continuing the activities in these unimportant places, pollution will increasingly go on and removing the groundwater and coastal pollution will be impossible to deal with.

Rehabilitation activities are thought to be obligatory in the plant areas whose actions have already been ceased.

Those plants with all kinds of danger to the environment are unfortunately constructed on coastal areas with high tourism potential. For this reason, selection of a suitable location is crucial. All the environmental issues that may occur in construction, operating and post operating stages should be considered seriously. Analyses of environmental problems such as the effect of selected location to plant units and water sources are as obligatory as the geological and hydrological investigations to find solutions to them.



REFERANCES:

Çapan, U., 1980, Toros kuşağı ofiyolit masiflerinin (Marmaris, Mersin, Pozantı, Pınarbaşı, Divriği) iç yapıları, petrolojisi ve petrokimyalarına yaklaşımlar, H.Ü. Yerbilimleri Enstitüsü, Doktora Tezi, 400 s.

Doyuran , V. 1999, Fethiye Özel Çevre Koruma Bölgesi Su Kaynakları Yönetimi, ODTÜ Proje kod No: 98-03-09-01-02, Ankara, 44 s. (Yayımlanmamış rapor)

Karagüzel, R., Mutlutürk, M., 2005, Fethiye Yat Çekek-Bakım-İkmal Kopleksi İnşaası Planlanan Yanıklar Köyü Karaot Mevkii ve Çavresinin Jeolojik-Hidrojeolojik İncelemesi, S. Demirel Üniversitesi, Yüksek Öğretim Vakfı, Isparta, (Yayimlanmamiş rapor)

Gökçe, A., 1995, Metalik Maden Yatakları, Cumhuriyet Üniv. Yayınları. No 59, Sivas, 307 s.

Şenel, M., 1997, 1: 100 000 Ölçekli Türkiye Jeoloji Haritaları, N0: 2, Fethiye – L8 Paftası ve açıklaması, MTA Jeoloji Etütleri Dairesi, Ankara, 22 s.

Şahinci, A, 1991, Doğal Suların Jeokimyası, Reform Matbaası, İzmir, 348 s.

Temur, S., 2001, Metalik Maden Yatakları, Nobel Yayın Dağıtım, Ankara, 285 s



ECOLOGICAL CONDITION OF THE ISSYK-KUL REGION.

Tynybekov AZAMAT

Kyrgyz Republic azamattynybekov@mail.ru

In Kyrgyzstan there are about 1923 lakes, with general area of 6836 sq.km., 84 % of lakes are located in a mountain zone (3000-4000 m. above sea level). One of such large lakes is Issyk-Kul. Height of its arrangement is 1600 m., depth is 668 m and length is 178 kms., the width is 60 kms, lake with no runoff also has increased mineralization and temperature of water: in the summer about 24 Celsius, in the winter 4 C.

The lake Issyk-Kul is located in a northeast part of Kyrgyzstan at the bottom of the deep tectonic hollow surrounded by the ranges Kungei and Teskeiî.

Issyk-Kul one of the biggest and deepest lakes of the planet. The originality of a geographical position, climatic, hydro-geological, hydrochemical characteristics, cause really unique features of this reservoir. 134 rivers flow into the lake. Many of them originate in eternal glaciers. In a warm season more than 60 % of a drain of the rivers fall to glaciers. The lake has no a drain, it accumulates in itself those mineral substances that the rivers and rains bring.

Climate in coastal areas marine mountainous, in high mountains - sharply continental. Average January temperature changes in limits from -1,5 up to-5,6 C and goes down with height. In the summer above Issyk-Kul hollow the area of thermal depression is established. The monthly average temperature of July varies in limits 17-19 C and goes down with increase of height of district up to 10 C. Mid-annual amount of deposits 200-350mm. With increase of height in process of progress to a watershed of a ridge the quantity of deposits is increased up to 600 mm.

The coast of lake Issyk-Kul is recreational territory where annually there comes a plenty of tourists. Number of constantly living population on the data collected 1999 makes in Tonskom area - 46701 people, and in Djeti-Oguz - 74414 people. However it is necessary to notice that, the southern coast of lake Issyk-Kul is subject to dangerous natural and industrial risks.

In territory of considered area the following natural processes and the phenomena are shown: earthquakes, have sat, high waters, snow avalanches, landslides and taluses. Snow avalanches, heavy winds, a hailstones, frosts, downpours, pulsation and Melting of glaciers, forest fires etc.

All these natural processes are typical for mountain regions and in case of their extreme display when there is a threat for life of people and integrity of engineering constructions and communications, these natural processes pass in the category of dangerous. Dangerous natural processes, in zones which defeats gets (in full or in part) settlements and their infrastructure, destabilizes economic and social conditions and cause emergency situations.



Distribution, repeatability, damage of listed natural processes are shown each year, and it is necessary to note, that by virtue of feature of a mountain relief in territory of Kyrgyzstan at occurrence of acts of nature may be formed so-called "synergetic" or in other words multistage, joint nature-industrial accidents.

Seismicity of region:

Susceptibility of settlements of seismic danger in considered territory is characterized by the following data. In Dzhety-Oguz area in a zone 8-9 mark seismic danger 22 settlements are located (villages Barskoon, Tamga, Kichi-Gargulchak, Ak-Terek etc.) with an aggregate number of the population over 30 thousand persons (living in 6400 housing constructions). In Tonskom area in a zone of 8-mark seismicity is 7 settlements (Kadji-Sai, Bokonbaevo) and 3170 housing constructions in which 22 thousand persons live.

High waters:

The danger of high waters is important in the valley of Ton river , because in the upper part of the river there are 3 glacier lakes , which have 1 category of danger to break . The probability of their break is increased with global warming a climate so on result of research it was received, that on Tien-Shan the maximal warming by 0,6 C. Per one year it is marked in average to a mountain zone Internal Tien-Shan, minimal on 0,2 C to a high-mountainous zone. In a seasonal course the greatest warming mentions fall-spring months (1,1-0,8) and to a lesser degree July in a high-mountainous zone of all 0,1.. For a congelation Tien Shan the negative greatest effect in a similar situation renders rise in temperature in autumn and spring months on 0,5 degrees, i.e. causes increase the period of thawing for 30-40 days that conducts to essential acceleration of thawing of glaciers.

Earth flows in Dzhety-Oguz area limit the area of the influence to a mountain part and adjoining to its undermountain zone. Therefore a zone of defeat of such streams are limited by channel of the rivers. In the Dzhety-Oguz area in flood dangerzone the general area of 1,097 sq.km. There are 9 settlements with the population more than thousand persons. In Tonskom area the general area of flood danger sites makes 0,16 sq.km. with the population more than 200 persons.

The period of danger of passage freshet and earth flows in the area, connected with features of a hydrometeorological mode is stretched for 5 months. The most dangerous is July. This month it is necessary 39 % of cases of passage freshet and earth flows, further on a degree of danger go June - 28 %, May - 13 of %, August - 11 of %, September - 9 of %. High waters and earth flows may be generated in March, April, October, however on the capacity they concede to streams of June - September and to maximal do not concern .

Snow avalanches:

Put an insignificant direct material damage, but indirect their consequences of flow it is very hard, the main danger of snow avalanches that in them people annually perish. As a whole on Issyk-Kul areas for the period of 1951-1985 it is registered 3936 avalanches.



Within the limits of considered territory it is the most active avalanche activity it is shown in river basin Barskoon, in area of pass Seok. The most active avalanche activity in the top highaltitude zone, in area of pass Barskoon where special danger is represented with Snow-ice avalanches. Huge blocks of ice, coming off from glaciers repeatedly broke the motor vehicles moving on motorway Barskoon-Uch-Koshkon (Kumtor)

Duration of snow avalanches danger in the period on range sites of this road makes 6 months (November - April). The period since February till April on which share it is necessary more than 70 % from total of avalanches is most dangerous in the avalanche attitude.

To most avalange danger sites of highway Barskoon-Uch-Koshkon concern pass sites: the western side of pass Barskoon on a piece from 42 up to 50 kms: northern side of pass Soek with 63 -65 km. The degree of avalanche danger on these sites is characterized as moderate with the maximal volume of avalanches up to 60 thousand m3.

Rockfalls and collapses(landslides):

Ridge Terskey Ala-Too where in process of progress to the east the area of development of these processes is considerably increased is most strongly subject landslide processes. It is connected, first of all, with increase of absolute heights of water-separate sites of a ridge and the modern congelation most advanced here.

In considered area to most rockfall and collapse danger concern highway Barskoon-Kumtor, on the following sites: 6,5-7,5 kms; 14-14,2 kms; 17,7-18,3 kms and 24,3-25,2 km.

Free estimation of danger of natural processes:

As a whole the territory of southern coast of Issyk-Kul is considered subject various on genesis to natural dangers (fig1). At the same time, it is obvious, that the same territory may be characterized by presence strong flood dangers, weak seismic and absence of avalanche danger or their other combinations.

To comparison of danger of various areas apply a way of construction of so-called synthetic maps where are shown the settlement generalized characteristic of various kinds of danger. On rice 2 the synthetic map of danger to the examined area, growing out imposing of three layers is given: flood, avalanche and seismic danger.

Division into districts of territory is carried out in points of intensity of risk by a technique shown above on an example of calculation of average parameter of seismic danger. The risk of display of danger for particular area in points varies from 1 up to 7. Differentiation of risk on categories is made in the following gradation:

Risk 1-2 points - the first category of risk (the risk is acceptable) Risk 3-4 points - the second category of risk (the risk is acceptable in part) Risk of 5-7 points - a category of risk (risk is unacceptable)



Radioecological monitoring:

About 1998-2000 year at southern coast of lake Issyk-Kul complex researches were carried out, including with use of the modern equipment measurements of a radiating background are executed and samples of ground and water are selected. The received results of measurements of various districts were analyzed together with coordinate characteristics and on these data the map evidently showing general radioecological conditions in investigated areas and sites near to a mouth of the rivers, running into lake on a southern coast is created. (Fig. 2.)

In the most part of the investigated territory the average data of levels Y-of radiation are within the limits of natural radiating background, only in some local sites the raised levels of radiation were fixed. (the Fig. 5) Places with the raised indications of a radio-activity is a beach near village Dzhenish, territory of shop #7 near to village Tone. A high background of a radioactive background in the certain places is explained by the high contents in ground of radioactive elements, thorium - up to 5 mg/g and radii -1,22 nKu/g which are products of disintegration of uranium.

During performance of researches selective measurements of a level of radiation indoors in various settlements were carried out. Results of analyses have shown existence of a significant difference of a level of a radio-activity indoors. On pic. 1 the average parameters of internal and external radiation are evidently submitted. Methods of a choice of researched houses casual character though old and new constructions got out had. Parameters of a level of radiation in some premises exceeds natural norms on some times. It in view of that measurements were carried out only in the afternoon and in the fall-summer period when the minimal contents of radon in air indoors because of often airing of the rooms.

The hydro-geological characteristic:

The physical and chemical structure of 7 rivers of coast of lake Issyk-Kul was investigated. The purpose of research consist in that to define an ecological condition of the rivers as they are the basic source of water supply of local villages. Research included, approbation of the rivers, in different phases of a hydrological mode: on ascending a hydrographic before a years high water, during a high water and in the beginning of fall-winter level of water.

By results of research, follows, that in all water-currents water fresh or ultra fresh, hydrocarbon calcium, characteristic for landscapes mineral distribution water in conditions of surplus of humidifying. Macro component structure of river waters of southern Issyk-Kul region is formed, first of all, due to chemical aeration (tab.1). A low mineralization, it is especial in long enough spring-and-summer high water when it is close to 0,1 g/dm3, low contents of some biologically active elements make potable water of area on these parameters ecologically unsuccessful, that may be obviously eliminated at realization of the medical and biologic actions directed on improvement of health as of resident population, and seasonal recreation.



Problem of radioactive storage influence on ecology:

As a result of operation of uranium deposits in territory of the Kyrgyz Republic from mid 1940s till 70s years, were formed mountain radioactive dumps and uranium storages.

Eventually under influence of natural factors there is an aeration, aeration and destruction, washout of dumps and storages. Redistribution of radioactive waste products and toxic chemical substances between storages and territory environmental surrounding it. It results in radioactive and chemical pollution of ground, superficial and underground waters, vegetative and fauna including a place of residing and ability to live of the person.

One of such representing danger of storages is located in 2,5 kms, to the east

One of such radioactive storage that representing the danger is posed in 2.5 kms. to the east of a settlement of a urban type Kadji-Sai. In a valley Suhoi Sai, with total amount 400000 m. a cube. radioactive storage consists of two parts. One half is built up economic constructions of an electrotechnical factory, and on other part is posed dump of ashes, creating padding load to radioactive storage. It is necessary to mark, that in Kadji-Sai oxide of uranium gained not by a traditional way, and from ashes "brown" uranium contents of coal Sogutin of a deposit. The coal extracted on local shaft by a underground way, beforehand was burned with passing framing of the electric power, and then the oxide o uranium was extracted by a lead-acid lixiviation from ashes.

The waste products and industrial equipment were buried. Under influence of natural processes and anthropogenous effects there is a process of corrupting of radioactive storage. An ore mine Kaji-Sai exposes to fluid wash, to high waters and claystreams which reduce in an offset of radioactive materials on a surface, that is by one of potential pollution of a southern coast Issyk-Kul lake.

For example, the shower rains in 1998 strongly have damaged insulating layer and dam of radioactive storage in 1.5 kms from coast of lake. The background radiation on separate sites noticeably was boosted.

The chemical units III dumps and radioactive storage can be both in miscible and in nonsoluble connections. Most dangerous of them are the relative frame forms of radioactive connections, as they first of all participate in an ecological chain; ground, vegetation - fauna - man.

Besides per the last years the local inhabitants in searches of non-ferrous metals will carry out excavation in radioactive storage. The synthetic violation of a screening layer of radioactive storage reduces in rise of a background radiation. Is possible that in a not screened bed of radioactive storage the polluted waters on underlying sites of a rock mass and coastal sites are filtered. The threat of radiation infection outgoes from possible shallow leakage of uranium scraps from failing of radioactive storage and dumps in ground or water.



There is a catastrophe, which represents major hazard to health of the people and gene pool. On statistical datas the mortality from malignant tumours in Kyrgyzstan makes 61,7 %. On Issik Kul region on 100 patients with malignant tumours it is necessary 81,6 died, that in 1,5 times it is more than on Republic. The population in Issik-Kul region looks like this - 434,9 men from this total, on cities it is necessary - 32,6 thousand and 302,3 thousand the man lives at villages. In Jeti-Oguz district - 74,6 thousand, \square To Π district - 54,0 thousand the man.

Datas on a case rate of children till 14 years for 1992-1997. In town Kaji-Sai the first place is borrowed with illnesses of organs of respiration, second infectious and parasitogenic diseases, then blood and hemopoietic organs and further of digestion, endocrine system, skin and hypodermic fat.

The comparative analysis by illnesses of the respiratory system has shown, that in a settlement the case rate by the given pathology was higher, than on area as a whole; in 1994 - in 2 times, and in 1995 - in 3 times, B1996 to year - in 3.7 times and in 1997 - in 3.6 times.

Detected, that III the speaker of a case rates of children in town Kadji-Sai and 133y/Iµ! region with illnesses of a blood and hemopoietic organs for 1994-1997. The body height is scored, and the metrics on a settlement exceeded regional III 1.3-2 times. Thus, for period 1994-1997. Metrics of a case rate of children till 14 years on 100 thousand population by illnesses of organs of respiration, blood and hemopoietic organs in Kadji-Sai were higher, than in Issyk-Kul region.

These datas requireholding specialized researches with usage of models Risk Assessment.

In 1997-2000 years the radiological researches III Issyl-Kul locale under the grant



THE LITERATURE:

1. I.A. Torgoev, Yu.G. Aleshin, A.K. Tynybekov

Estimating of the risk of dangerous natural process on southern coast of Issyk-Kul lake.

International conference Human health and environment. Strategies and Programmes in new millenium. Bishkek-Cholpon-Ata, Kyrghyz Rrepublic.

2. V.E. Matychenkov, A.K. Tynybekov.

Comparative study of the composition of the study of Southern Issyk-Kul Rivers.

International conference Human health and environment. Strategies and Programmes in new millenium. Bishkek-Cholpon-Ata, Kyrghyz Rrepublic.

- 3. D.M. Hamby and A.K. Tynybekov
- A Ascreening assessment of external radiation levels on the shore

of lake Issyk-Kul the Kyrgyz Republic.

Heals physics, USA, October 1999, V 77, 44, p.p. 427-430.

4. A. K. Tynybekov, D. M. Hamby

The radiological characteristic of a coastal zone of Issyk-Kul

lake. Environment and health of the man, p.7, 1999, Bishkek, p.p. 100-107.





MONITORING URBAN GROWTH IN TURKEY: CURRENT TRENDS AND FUTURE PROJECTIONS FOR SUSTAINABLE URBAN PLANNING

Nükhet GÜNBEYAZ*, N. Gamze TURAN**

*Ondokuz Mayıs University, Engineering Faculty, Dept. of Geodesy and Photogrammetry Engineering,Samsun/Turkey, **Ondokuz Mayıs University, Engineering Faculty, Dept. of Environmental Engineering, Samsun/Turkey, nukhetg@omu.edu.tr,gturan@omu.edu.tr

Increased urbanization is a global problem and a form of environmental change that impacts directly on the day-to-day lives of people. Urbanization in Turkey is a response to a rapid population increase and migration from rural areas to cities. Especially from the 1950 onwards, industrialization and immigration to cities have increased. Urban population formed 23-25 of the total population before the year 1950, but it increased continuously after that and reached 65% in 2000. It is expected to be near 70% by the year 2010. The purpose of this study is to provide a broad overview of the recent patterns and trends of urban growth in Turkey as a developing country.

Key Words: Urbanization, urban growth, city planning, sustainable development.

INTRODUCTION

Today, almost all urban growth is taking place in rapidly growing cities of the developing world. Most people are not aware that the overwhelming majority of the urban growth in the world today (over 95%) is taking place in developing countries, also referred to as less developed countries. Since 1950 the population living in developing world cities has increased fifteenfold (11). Nearly half the world's population now lives in urban settlements. Cities play a vital role in the social fabric of countries and in national and regional economies worldwide. Cities offer the lure of better employment, education, health care, and culture; and they contribute disproportionately to national economies (10).

Urbanization can be regarded in its three aspects. Firstly, it involves the changes in the size, density and composition of populations in different areas; secondly, it involves fundamental changes in the economic structure of a society; and thirdly, changes in human behavior (12).

National income and level of human development are strongly and positively correlated with level of urbanization. However, rapid and unplanned urban growth is often associated with poverty, environmental degradation and population demands that outstrip service capacity.

The specific aims of the paper are: (i) to the recent patterns and trends urban growth in Turkey, and (ii) to relate environmental aspects with population census data. This paper, adopting a problem-based approach, also identifies practical alternatives, solutions and opportunities for sustainable urban planning.



SUSTAINABLE URBAN PLANNING

Uncontrolled growth of cities is the main problem in the beginning of 21st century. Rapid and often unplanned urban growth is the source for many of the environmental hazards faced by cities within the developing world. Substandard housing on marginal land, crowding, increasing levels of air pollution, water pollution and over usage, inadequate sanitation services, in adequate solid waste collection, and motor vehicle traffic and traffic injuries are all associated with rapid growth of urban centers (10).

The speed and scale of increase in the largest cities and metropolitan areas can create enormous stresses on the immediate and surrounding environment and poses major challenges for sustainable development (1).

Urban sustainability increasingly requires the abatement of pollution, plus the addition of positive features, notably trees, to ameliorate the new scarcity of healty environments (5, 9, 12).

Sustainable urban planning is a planning approach against the consumption and the loss of environment. Sustainable urban plans are strategic plans. The plans determine the urban, archeological, historic protection areas, other natural environment protection areas, valuable agricultural land, forestry, water resources etc. which put the protection regulations and urban density controls and use green transportation systems for creating environmentally sensitive urban planning (4).

URBAN GROWTH IN TURKEY

Turkey is a developing country in which 68 million people are living with quite different socioeconomic and demographic features and dietary habits. One of the major challenges for Turkey is planning for population growth.

Currently, over 45% of Turkey population lives in urban areas and the annual population growth rate is around 2.4% year⁻¹in urban areas compared around 1.7% year⁻¹in non-urban areas (13). Annual growth rate of population in Turkey, 1935-2000 is shown in Fig. 1.

The main factors behind this transformation are the general population boom of the 20th century and the rapid economic growth, which is typically associated with a decline in the share of the industrial and service sectors. The latter sectors are mostly concentrated in urban areas (14).



International Conference on Environment: Survival and Sustainability 19-24 February 2007 Near East University, Nicosia-Northern Cyprus



Figure 1. Annual growth rate of population in Turkey, 1935-2000

Proportion of urban and rural population in total is showed in Fig. 2. Compared against the rapid rise in the urban population, the growth of the rural population in Turkey has been relatively slow. While Turkey's urban population increased thirteen-fold between 1927 and 2000, the Turkey's rural population less than three-fold going from 10.3 million in 1927 to 23.8 million in 2000. Thus, all future population growth for the foreseeable future is expected to be absorbed in urban areas.



Figure 2. Population growth in Turkey, 1927-2000



Urbanization in Turkey is a response to a rapid population increase and migration from rural areas to cities. Over half of Turkey's population lives in such unplanned and dubious housing, known as "gecekondus" (6, 9). Gecekondu dwellers "are aware that their life in the city, handicapped by lack of education and social status, started at a very low level; but they believe that they have come a long way (3).

Urbanization and city growth are caused by a number of different factors including ruralurban migration, natural population increase, and annexation. Understanding and managing the urban growth is a prerequisite for addressing sustainability, an increasingly important issue across a range of disciplines. In Turkey, a large proportion of the national population lives in the largest city as in many developing countries. This is not the case in more developed countries, which tend to have more advanced urban networks (2).

REGIONAL URBANIZATION DISPARITIES IN TURKEY

Turkey is divided into seven geographical regions based on climatic features: the Black Sea, Marmara, Aegean, Mediterranean, regions having coastal areas, and the Central, Eastern and Southeastern Anatolia. These regions are shown in Fig. 3.



Figure 3. Major geographical regions of Turkey

Urbanization in Turkey has been strongly influenced by regional disparities in wealth, industrial development, agricultural productivity, and public services. The western half of the nation has more favorable topography and rainfall than has mountainous and arid eastern Anatolia, and farming has been substantially more productive in the west than in the east. Therefore, western Turkey has developed economy and modernized society. The eastern provinces, by contrast, have remained physically, economically, socially, and culturally isolated from the mainstream of modern Turkish development, with a poor and illiterate population engaged primarily in subsistence agriculture (3).



Regional differences, in turn, contribute significantly to the development of a system of cities dominated by the large metropolitan complexes of western Turkey. Distribution of urban and rural population by major geographical region in 2000 is shown in Fig. 4.



Figure 4. Distribution of urban and rural populations by major geographic regions, 2000

Migration has been the prime driving force behind rapid urban growth in Turkey. Patterns of rural-urban migration vary considerably from one national setting to another. Migrants may go directly from the countryside to the largest cities, or they may move in steps, from village to town to small city and then to the metropolis. In Turkey, the most migrants eventually settle in the larger cities, but many initially move from village to smaller city, which increases the number of settlers in the metropolitan centers who have had some experience with urban life. Distribution the urban-rural population by city size groups in 2000 is shown in Fig. 5.





Figure 5. Distribution the urban-rural population by city size groups, 2000

Turkey's large cities have been the driving force behind the rapid urban growth of the past decades. Economic expansion was concentrated in existing large cities, and migrants flocked to these established urban centers. Because of their attractions, large cities have grown much faster than lesser ones, and their share of urban population has steadily increased. Istanbul is the most dynamic city in the Marmara region of Turkey. During the explosive growth, more than 90% of all migration was to city and its combined population was approximately 10 million in 2000. Rapid urbanization spurred the growth of other urban centers as well. Among the fastest-growing urban centers, Ankara (in central Anatolia region), Izmir (in Aegean region) and Adana (in Mediterranean region) are other large cities.

Rapid outward growth has complicated the manifold problems of Turkey's cities. Development outpaces the provision of public services and bears little relationship to official plans. Local roads, water supply, waste disposal and other public facilities often are nonexistent in newly settled areas.

CONCLUSIONS

Managing urban growth in Turkey has become one of the most important challenges of the 21st century. Numerous legal and institutional reforms in many countries as in Turkey have given shape to institutional reforms at the local and municipal levels. Consequently, solutions to urban problems are increasingly being sought at the local rather than the state or national level. These trends underscore the urgent need to build and support the capacity of local governments to manage the environmental and social service problems that accompany rapid urban growth.



REFERENCES:

1.Brockerhoff, M.; Brennan, E. The poverty of cities in developing regions. Popul. Dev. Rev., **1998**, 24, 75-114.

2.Cohen, B. Urbanization in developing countries: Current trends, future projections, and key challenges for sustainability. Technology in Society, **2006**, 28, 63-80.

3 Danielson, M.N.; Keleş, R. The Politics of Rapid Urbanization. Holmes & Meier Publishers, Inc., United States of America, **1985**, 286 p.

4.Ercoşkun, Ö.Y. Sustainable city plans against development plans. G.U. Journal of Science, **2005**, 18, 3, 529-544.

5.Finco, A.; Nijkamp, P. Pathways of urban sustainability. Journal of Environmental policy and Planning, **2003**, *3*, 289-302.

6.Goksel, C.; Kaya, S.; Musaoğlu, N. Using satellite data for land use change detection: A case study for Terkos water basin, Istanbul. Proceedings of the 21st EARSeL Symposium, Rotterdam, Netherlands, **2001**, 299-302.

7.Gultekin, E.; Ortacesme, V. Land degradation in Adana city within a historical perspective. Proceedings of the First International Conference on Land Degradation, Çukurova University Press, Adana, Turkey, 1996, 279-289.

8.Jim, C.Y. Green-space preservation and allocation for sustainable greening of compact cities. Cities, **2004**, 4, 21, 311-320.

9.Kaya, S.; Curran, P.J. Monitoring urban growth on the European side of the Istanbul metropolitan area: A case study.International Journal of Applied Earth Observation and Geoinformation, **2006**, 8, 18-25.

10. Moore, M.; Gould, P.; Keary, B.S. Global Urbanization and Impact on Health. Int. J. Hyg. Environ. Health, **2003**, 206, 269-278.

11. Palen, J.J. The Urban World. The McGraw-Hill Companies, Inc., 7th ed., New York, 2005, 378 p.

12. Pincetl, S. Conservation planning in the west, problems, new strategies and entrenched obstacles. Geoforum, **2006**, 37, 246-255.

13. State Institute of Statistics. Population and Development Indicators. Republic of Turkey, Prime Ministry, Turkish Statistical Institute, 2002, Ankara.

14. United Nations, World urbanization prospect 1990, Estimated and Projections of urban and rural populations and of urban agglomerations, Dept. of International Economic and Social Affairs, USA, 1991



ⁱⁱ See Lee et al. (2000); Osti G. (2000); Ray C. (2000); Shucksmith M. (2000), *Endogenous Development, Social Capital and Social Inclusion: Prospective from LEADER in the UK*, Sociologia Ruralis, Vol. 40, n.2, pp 208-218, Blackwell Publishers.

ⁱⁱⁱ Local competitive advantages as goods, productions etc. (endogenous or exogenous) that can contribute to the development of the territory in social and economic terms. For more information see Pichierri (2003, 2005).

^{iv} Planed also coordinates other projects in Pembrokeshire in rural regeneration, environmental economics and social themes. Projects and initiatives are sponsored by the EU, government and local government. The themes of the initiatives are oriented to environmental sustainability, new employment in sustainable agriculture, sustainable tourism development, social issues and involvement of local communities in the identification of local opportunities.

^v The Taf and Cleddau Rural Initiative was established in 1986, with the aim of giving local people the chance of playing a significant role in assisting and developing their community in a social, environmental, economic and cultural sense. This initiative was the first in Wales to try to bring the then main development agencies - The Welsh Development Agency, The Countryside Commission (later to be replaced with the Countryside Council for Wales, CCW), The Wales Tourist Board - together with County and District Councils, into a local partnership with the people of an area to develop strategies to address the area's needs and opportunities.

^{vi} It is coherent with the first Action of the LEADER+ strategy in Wales, *Improving the Quality of Life in Rural Communities* (Measure 1). It focuses on local communities. The starting point for work under this Theme is a process of community consultation. LAG develops strategies to meet the needs and aspirations of local communities based on the result of the consultation.

^{vii} Rural Community Action is a Welsh Assembly Government programme to empower communities and enable them to take responsibility for the regeneration of their area. Planed is the managing partner of the Pembrokeshire Community Action Strategy. The theme of the strategy in Pembrokeshire is *Sustainable Communities*.

^{viii} The theme of the project is *Supporting Communities* and it focuses on community consultation, engagement and development at individual community level.

^{ix} See consideration about Sparc in Shucksmith M. (2000), *Endogenous Development, Social Capital and Social Inclusion: Prospective from LEADER in the UK*, Sociologia Ruralis, Vol. 40, n.2, pp 208-218, Blackwell Publishers

^x Trigilia uses this category to define strong, heavy partnerships. These partnerships can be a real example of territorial affiliation and can create a positive push in terms of policy decision-making but, at the same time, in these coalitions it is easier to observe negative aspects such as collusive coalitions. (Trigilia 2005 p. 32-34).

^{xi} Trigilia uses this category, in contrast with the previous one, to define weak partnerships. Weak because they did not exist before and they have been recently created for various reasons. These coalitions are weaker than the previous ones, but at the same time it is more difficult to observe opportunistic aspects than in the previous ones (Trigilia 2005 p. 35-38).

^{xii} Through these projects tourism is seen as an important element for the development of the territory and, at the same time, sustainable tourism is seen as a way of maintaining local environmental resources, local traditions and local culture in general in a sustainable form.

^{xiii} This strategy is closely linked to the LEADER+ initiative. It aims to improve sustainable actions in agriculture. Some of the main points are to increase local employment, to create new strategic local sectors in agriculture and to improve the quality of life in a rural context.

xiv The aim of this programme is to develop sustainable communities that can contribute in terms of participation, involvement etc. to policy decision-making and, therefore, to development of the communities themselves.

^{xv} This project is oriented to working "in and for" the environment. The main aim is to implement local, national and EU strategies in terms of sustainable development oriented also to creating new employment.

^{xvi} This programme is oriented to developing new entrepreneurial activities or to assisting existing ones.

^{xvii} According to Becattini, Omedei Zorini, "local system" is not only when the evolution, organization and competitiveness of a system depend on technical progress and investment, but also on institutional, cultural and moral factors of the local context (Garofoli, Mazzoni in Becattini, Omodei Zorini 2003 p. 16).

^{xviii} Van der Ploeg (1994) in Becattini, Omodei Zorini 2003 p. 17.

ⁱ Locality as "space for social interaction". Giddens in his "theory of structuration" argues that localities are the space in which human interaction takes place and that this interaction produces relational spaces (e.g. powers, sets of institutions, community relations etc.). In Giddens's structuration theory the localities are the starting-point for the social practices and, furthermore, the localities are the starting-point for the regionalization theory that defines the multilevel space of actions. For more information see Giddens (1984).



INDEX

A

A. A.HAROUN, 3237 A. ABAZI, 2225 A. AKKURT, 3551 A. ALATON, 4015 A. Baran DURAL, 3797 A. BEZZAR, 3157 A. Bülent GÖKSEL, 5453 A. Çinçinoğlu SALICI, 2917 A. Duygu KAÇAR, 903 A. Ekrem YÜCE, 1515 A. ESMAILI, 5421 A. Gökhan YILMAZ, 4280 A. H. ZAKRI, XIII A. I. OLAYINKA, X A. JAGADEESH, X A. K.ONUR, 4007 A. L.SALPYNOVA, 2233 A. MACHINCHIYAN, 5421 A. MELINTESCU, 1953 A. MIKAELYAN, 4791 A. O. AKSOY, 4059 A. PERENDECI, 3019 A. Ph. SAVINKOV, 2233 A. R. DEMIRKIRAN, 3013 A. R. KESHTKAR, 4288 A. R.VAEZI, 4183 A. RAHMANI, 359 A. S. OYEKALE, 5233 A. SALAJEGHEH, 4288 A. SANDIKCIOGLU, 3551 A. SHAKHNOVSKY 4199 A. Suat ATEŞ, 5051 A. SEN, 3459 A.T ALEVA, 3465 A. VALACKIENE, 1563 Abdollah Fatollah ZADE, 1737 Abdollah Hassanzadeh GORTTAPEH, 1737, 1925 Abdul KHAKEE, X Abdul Razzaq GHUMMAN, 3687 Abdulkadir DEVELI, 111 Abdullah Adil ANSARI, 3003 Abdullahi Elmi MOHAMED, X Ada KERTUSHA, 1323 Adem BAYRAM, 3541 Adem EREN, 4995, 5095, 5105 Adnan DİLER, 1015

Adrián MENDOZA, 1393 Afig MALIKOV, 2359 Agustin Gonzales Fontes de ALBORNOZ. X Aharon KLIEMAN, 4517 Ahmad KHAN, 3069 Ahmad MARRAKCHI, XIII Ahmet ACAR, 5063 Ahmet BALCI, 3187 Ahmet BOZKURT, 3325 Ahmet CELIK, 2099 Ahmet DEMIRAK, 3187 Ahmet DURAN, 621 Ahmet GÖKKUS, 557 Ahmet HADROVIC, 4326 Ahmet IPEK, 459, 467, 753 Ahmet KOCATAŞ, 5051 Ahmet Nesimi KİŞİOĞLU, 2343 Ahmet SAMSUNLU, 1437 Ahmet SAVAŞAN, IX Ahmet SERTESER, 277 Ahmet Uğur DEMİR, 2305 Ahmet YÜCEER, 3043,3961 Aiad Ashor ALTAAY, 2615 Aimal KHAN, X Akbarinia MOSLEM, 387 Akhmedov Zaur MUSA, 2479 Akiva FLEXER, 4121 Alaaddin YÜKSEL, 1931 Alberto ARENAS, 2395 Aleh RODZKIN, X, 1673 Aleksandra NASTASOVIĆ, 3423 Aleksandra PEJČIĆ, 2559 Alev BAYSAL, 4575 Alev YUCEL, 2187 Alex CHENG, X Alexander FEHÉR, 313 Alexey Arkady VOINOV, XIII Ali Abdual Zeahrah ALWAILY, 2615 Ali Emre AKGÜN, 1975 Ali GÜNEY, 1521 Ali İŞMEN, 439 Ali KESKİN, 1817 Ali UNYAYAR, 3509 Alkan ÖZTEKİN, 439 Alp ÖZERK, IX Alpaslan ATES, 3081 Altıngül Özaslan PARLAK, 557 Altuğ ŞENOL, 2365 Amit KULKARNI, 4481 Ammar RAFIEI EMAM, 2769 André Francisco PILON, 5399

Andrea E. RIZZOLI, XIII Andrew BROOKES, XIII Andrew MCKILLOP, 1903, 1911 Anıl SOYUMERT, 353 Aniello Russo SPENA, 3777 Anjum SUHAIL, 4753 Anna RE. 2451 Anne BUTTIMER, XIII Annelie SJÖLANDER-LINDQVIST, 1793 Anthony J. JAKEMAN XII Antonije ONJIA, 3423 Antonio PRESTIA, 1043 Anwar NASIM, III, XIII Archana GODBOLE, 221 Armağan KORKMAZ, 781 Arturo Sousa MARTIN, 4155 Arzuhan Burcu GÜLTEKİN, 1207 Asal ROOHISALARI, 1737 Asım KADIOĞLU, 595 Asım VEHBİ, XXVII Aslı Sungur ERGENOĞLU, 5189 Aslı TUNCOL, 889 Aslıhan KABTAN, 339 Atilla ERİŞ, 453, 459, 467, 753 Ayca TELATAR, 2187 Ayda AKKARTAL, 4709 Ayfer AYTUG, 5189 Ayhan AYTAC, 1303 Aykut SAGLAM, 595 Ayla ARSLAN, 2005, 3291 Ayla ÖZER, 3471 Aylin KAYA, 2793 Ayman Abou HADID, X Aysel KEKILLIOGLU, 329 Aysel YONTAR, III, IX Aysu KES, 4417 Aysun SOFUOĞLU, 3393 Aysun TÜRKMEN, 3081 Ayşe Bahar YILMAZ, 3139 Ayşe DÖNMEZER, X Ayse EVEREST, 611 Avse ÖZDEMİR, 621 Ayşegül KIBAROĞLU, 4507 Ayşegül SAMSUNLU, 121 Ayşen AKSU, 889 Aytaç YILDIRIM, 5429 Aytan HAKAN, 5357 Ayten EROL, 1133 Ayten SURURI, 2471 Aytuğ SIVASLIGIL, 3119 Aytul SOFU, 2091



Azhar ALI, 4689,5009 Aziz ERTUNÇ, X, 4587 Aziz ŞENCAN, 3027 Azra JAGANJAC, 2387

B

B. ARMAGAN, 1859 B. BIZHGA, 4769 B. D. TRIPATHI, 2983 B. ESKIN, 695 B. INCE, 3227 B. MAVI, 3555 B. MIOVA, 2225 B. TÜTÜNCÜ, 3459 Babagana ABUBAKA, 4477, 5015 Bahar BAYHAN, 5055 Bahar Güçiz DOĞAN, 5365 Bahar TANK, 5063 Bahri AYDIN, 5357 Bahtiyar EROĞLU, 917 Banu ÇAKIR, 2301 Barış GÖRAL, 4709 Barış ÖNOL, 3679 Barry W. WILSON, XIII Başak İPEKOĞLU, 3393 Başak MESCİ, 3601 Bayram Ali MERT, 3961 Beatriz LORA, 1777 Behzat GÜRKAN, 353 Belay TEGENE, XII Benoit GUIYESSE, 3415 Beran GÜLÇİÇEK, 1379 Berna Balcı İZGİ, 2869 Berna BARADAN, 4605 Berra Gültekin SINIR, 5105 Beşer Oktay VEHBİ, 977 Beyza AĞCIOĞLU, 5269 Beyza Şat GÜNGÖR, 2461 Beyza ÜSTÜN, 5269 Bhattacharyya APURBA, 4143 Bilsen BELER BAYKAL, 1505 Birutė DARŠKEVIČIŪTĖ, 95 Biserka DIMISKOVSKA, 2213 Bjarne Bruun JENSEN, XIII Bouazzi NAGIA, 5117 Branimir JOVANCICEVIC. XIII Burcu ERTEM, 2833 Burhan SAKALLI, 889 Bülent MİRAN, 2163

Bülent TOPKAYA, 3059,4350 Bülent VEREP, 3267

C

C. YALÇIN, 3555 C. YARCI. 695 Cahit Tagi ÇELİK, 3353 Can KARA, 789 Canan CENGIZ, 955 Caner ZANBAK, 1515 Cankut ÖRMECİ, 2657, 2667 Cansu Filik İŞÇEN, 3097 Cantürk CANER, 2907 Carmit LUBANOV, 5309 Carol YÜRÜR, 5453 Celal F. GÖKÇAY, 1365 Celalettin Eren OĞUZ, 1975 Cem BİROL, 2591 Cem HAMI, 1983 Cem SORUŞBAY, 3669 Cemal BULUTOĞLULARI, XXVI Cengiz MUTLU, 3267 Cengiz YILMAZ, 1379 Cenk ÖNER, 4935 Ceren KELEŞ, 4987 Ceren PARALİK, 2591 Ceren UYSAL OĞUZ, 3813 Cevdet TINAZCI, 5371 Champika KARIYAWASAM, 3939 Charles MLINGWA, 249 Charles N. ALPERS, XIII Cheslav ROMANOVSKY, 1673 Christoph J. BLASI, 4037 Costa MARQUES, 37 Coşgül YÜKSEL, 4859 Coşkun BULUT, 4635 Coskun ERUZ, 2275 Cristina FIERA, 255 Cristina MUNTEANU, 255

Ç

Çağatay GÜLER X,1975, 2173, 5357 Çağrı GÖKDEMIR, 5269 Çiğdem ÇİFTÇİ, 4027, 4334 Çiğdem YIĞIN, 439

D

D. GALERIU, 1953 D. GULER, 4007 D. HOVHANNISYAN, 4791 D. K. CHAKRABORTY, 1195 D. KARADAG, 1463 D. KUZNETSOV, 4047 D. M. S. KADYAMPAKENI, 3847 D. MOHAN, 1597, 3279 D. OUAZAR, 2785 D. SUSNIENE, 1563 Dafina NIKOLOVA, 1331 Daiva BERŽINSKIENĖ, 95 Dan C. C. GALERIU, XIII Dana KOLEVSKA, X Daniela RADUCU, 255 Daniela ŞINCU, 3197 David A. STAH, XIII David HUMPHREYS, 3785 Davut AYDÜZ, 5381, 5391 Demet UYGAN, 4255 Deniz Anıl ODABAŞI, 439 Deniz BABUŞ, 3735 Deniz BOZKURT, 4965 Derin ORHON, III, XIII, 4015 Dervis YUKSEL, 1491 Derya B. ÖZKAN, 1821 Derya Çakır AYDIN, 5343 Derya ÇAMUR, 5357 Derya EŞEN, 339 Derya OKTAY, 789 Devrim Yücel BESIM, 2417 DharmPal MALIK, 1179 Dicle AYDIN, 941 Didem EVCİ, 2173 Dilek ASLAN, 2105 Dilek DEHMEN, 5365 Dilek TAYLAN, 4280 Doğan CANIVAR, 5095 Dragana ĐORĐEVIĆ, 3423 Dragica JAKOVLJEVIĆ, 3423 Dudu ÖZKUM, IX, 537 Dunja ANDIC, 2559 Duygu ERDOĞAN, 5365



E

E. DIMCO. 4769 E. DJONOVA, 3465 E. Gülbuğ EROL, 4845 E. M. GURBANOV 749 E.O. SOOLA, 5317 E. OSMA, 695 E. Sibel BEŞLİ, 3267 Ebenezer Adebisi OLAWUYI, 4885 Ebru SAATCI, 345 Ebru Z.BOYACIOĞLU, 5247 Ece TURHAN, 453, 459, 467, 753 Ece Ümmü DEVECİ, 5063 Ed BOLES, X Edip AVŞAR, 3767 Edwin NJEBA NGANJI, 2435 Egemen ARAS, 3401,3991 Ekmeleddin İHSANOĞLU, XXXV Ekrem KURUM, 4155 Ekrem Şanver ÇELIK, 439 Ela ATIŞ, 1535,2163 Elchin KHALILOV, III, XIII Elçin AKDUMAN, 2353 Eliahu ROSENTHAL, 4121 Elif GÜNDÜZ, 931,3915 Elif KARAKURT TOSUN, 2907 Elif KUZU, 3089 Elizabeth GONZALEZ X Elizabeth THOMAS-HOPE, X Elsa GEGA, 2123 Emel BADUR, 2833 Emel ÖZKAN, 345 Emel Tozlu ASLAN, IX Emel YILDIZ, 5247 Emine BUDAK, 5083 Emine Ş. OKUDAN, 439 Emine YALCIN, 2139 Emine ZAİMOĞLU, 2711 Emrah A. ERKURT. 3509 Emrah YALCINALP, 393 Emre DURMAZ, 2015 Engin GÜRTEKİN, 3037 Epule Terence EPULE, 2195 Ercan KÖSE, 1817, 2275 Ercan SARIDOĞAN, 1549 Erdinç ŞAHİNÖZ, 287, 305 Eren SARIKAYA, 2505

Ergün TAŞKIN, 295 Eric JOHNSON, XIII Ersi Abacı KALFOĞLU, X Ersin KARABACAK, 571 Ersin USKUN, 2343 Ersin YÜCEL, 565, 651,659 Ertan TAŞKAVAK, 5055 Esad BUKALO, 4665 Esra MARTÍN, 621 Esra YALDIZ, 917 Esteban G., JOBBAGY, XIII Eşref CERRAHOĞLU, XXV Eti Akyüz LEVI, 4899 Eunkyung LEE, 3149 Evelina BAZINI, 1323 Evin ARAS, 2257 Evren CALISKAN, 3559 Evren KOBAN, 345 Evrim CELİK, 3149 Ezel TİLKAN, 3187

F

F. B. ÖZDEMİR, 3551 F. Balık ŞANLI, 2727 F. BALTACI, 4007 F. DEMET, 839, 5343 F. GHOMARI, 3157 F. I. LATIFOV, 3433 F. KULALI, 3555 F. M .SULTANOVA, 3411 F. Nur AKSAKAL, 2257 F. Saadet KARAKULAK, 1481 F. SEVENCAN, 2539 F. Yeşim EKİNCİ, 2091 F.Z. ABDULAEV, 3433 Fabian M. JAKSIC, XIII Fadim YAVUZ ÖZDEMİR, 3915 Faize SARIŞ, 3657 Faral ARAL, 305 Farhad FARAHVASH, 671 Farhad JAFARI, 671 Farhat M. ALI. XIII Farmik Vali MOHAMADI. 1925 Farudin HOXHA, 1725 Faruk ARAL, 287 Faruk TEKBAŞ, 2173 Faško MARTIN, 4081 Fathi ELOSTA, 4243 Fatima BATOOL, 3069 Fatma CESUR, 1303

Fatma KALPAKLI, 4581 Fazıl ÇELİK, 4955 Fehime Yeşim GÜRANİ, 769 Fehminaz TEMEL, 2173 Ferdağ ÇOLAK, 2321 Ferdi SABİT SOYER, XXXIV Ferid MURAD, XIII Feriha YILDIRIM, 2517 Ferit YAKAR, 4955 Fernando CASTRO DE ABREU, 1685 Fethiye GODE, 3027 Feyera SENBETA, 475 Feyza CANDAN, 637 Feza GEYİKÇİ, 4362 Fidan AKBAS, 1057 Figen Esin KAYHAN, 4797 Fikret ÇAKIR, 439 Fikret ÖZGÜR, 5357 Filiz BULUT, 2105 Filiz DİLEK, X, 1365 Filiz GÜR, 3301, 3585 Filiz SAVAROĞLU, 2321, 2989 Filiz SUNAR, 4709 Fiona J. Y. ROTBERG, 4387 Firdaus Fatima RIZVI, 3951 Florence NANGENDO, 689 Folashade O. OMOKHODION, 2157 Folorunso Sunday AYADI, 4367 Frank BATES, 1527 Frederick I.B. KAYANJA, XIII Funda CETÍNDAĞ, 2845 Funda KAHRAMAN, 1817 Funda SEVENCAN, 2173 Funda TIHMINLIOĞLU, 3393 Funda VARNACI, 2603 Furkat KHASSANOV, X Füsun Erkan YURDABAK, 439

G

G. A. URAZOVA, 2233
G. BOZTAŞ, 2539
G. CİVELEKOĞLU, 3019, 3523
G. M. KULNIYAZOVA, 2233
G. R. MUGHAL, 67
G. S. HASANOV 3433
G. STATYUKHA, 1609, 4199
G. TORUNOĞLU, 4015
G. TOZ, 871



Gabriele VOIGT, XII Gagik TOROSYAN, 2585, 4237, 4791 Galip AKAY, XIII Gamze Yücel IŞILDAR, 2517, 2895 Gaudelia A. REYES, X Gaye TUNCER, 2421 Gazi CONTUK, 4797 G-C. FANG, XIII Geoff BERTRAM, XIV George CONSTANTINOU, X George G. LUNT, XIV George PETRIDES, X Gerald J. ZAGURY, 2149 Gerald LALOR, XIV Germano MWABU, XIV Gh. ZEHTABIAN, 379 Gh.A. JALALI, 641 Ghasem Ali Dianati TILAKI, 325 Ghorban ELMI, 2879 Giovanni BARROCU, III, XIV Giovanni QUARANTA, 4109 Girja K. SHUKLA, XIV Giuseppe FUMAROLA, 3777 Gopal B. THAPA, XIV Gökçen BİLGE, 5055 Gökçen BOMBAR, 1833 Gökhan KAYADURMUŞ, 4453 Gökhan ÖZDEMİR, 1817 Gökhan SAVAROĞLU, 2989 Gönül Tuğrul İÇEMER, 4987 Gözde AKGÜN, 2687 Grainne GILMORE, 529 Gregory KOFF, 4673 Guido VAN HUYLENBROECK, 1081 Gunnar TELLNES, III Guntis BRUMELIS. X Guo JIAN-FENG, 4597 Guor-CHENG FANG, 2943 Gülcan ÖZKAN, 2327, 4801 Gülcan SARP, 2631, 4619 Güler TEPE 2105 Gülerman SÜRÜCÜ, 1365 Gülhayat Gölbaşı ŞIMŞEK, 143 Gülistan ERDAL, 1849 Gülnur Mertoğlu-ELMAS, 1941 Gülriz BAYCU, 3419 Gülsen BOZKURT, 2055 Gülser ÇELEBİ, 1207 Gülsüm TER, 941 Gülşah ELDOĞAN, 5365

Gümüş Funda GÖKÇE, 3443 Günay KOCASOY, X, 2971 Güngör TURAN, 4469 Günseli YAPRAK, 3301, 3585 Gürdal HÜDAOĞLU, IX Güven GÖRK, 2935

Η

H. A. BAHRAMI, 4183 H. A. YALIM, 3551 H. ABGHARI, 4647 H. AHMADI, 4647 H. AKYILDIRIM, 3551, 3555 H. ARZANI, 2747 H. AYDIN, 3595 H. AZARNIVAND, 379 H. BAYHAN, 1463 H. Derya KOL ARSLAN, 4655, 5301 H. Ece SALALI, 1535, 2163,5453 H. EJTEHADI, 487 H. F. MANSOUR, 3237 H. Filiz Alkan MESHUR, 2647 H. KESHTKAR, 4288 H. M. MASHALY, 3237 H. MIRDAVODI, 2747 H. Q. WANG, 3157 H. R. NASERI, 379 H. S. TORTOP, 1767, 1947 H. W. RYU, 3533 H. Zahedi POUR, 487 Habib Amir- HALAJİ, 671 Habib SAADOULI, 4264 Hafiz Mogira BADAR, 3069 Haim SHULMAN, 4121 Hakan ACET, 111 Hakan ALLI, 2365 Hakan ALPHAN, 187 Hakan ALTINTAŞ, 2205 Hakan ATAMTÜRK, 2533 Hakan AYGÜN, 5063 Hakan BAHADIR, 2935 Hakan HAKYEMEZ, 557 Hakan OĞUZ, 3819, 5469 Hakan TONGAL, 3981 Hakan TÜRKOĞLU, 2343 Hale ÖZGİT, 5429 Halil CAKAN, 187 Halil SEYIDOĞLU, 1155 Halime PAKSOY, X

Halit FİLİZ, 5055 Hallvard ØDEGAARD, X Hana RUSI - SALIU, 5281 Hanwant B. SINGH, XIV Haris BRADIĆ, 4326 Hartmut FRANK, XIV Hasan AKCA, 5197 Hasan BÖKE, 3393 Hasan CESUR, 3495 Hasan ERTEN, XI Hasan GÖKSEL ÖZDILEK, 3767 Hasan Ş. HAŞTEMOĞLU, 781 Hasan VURDU, 241 Hasan ZOLFAGHARI, 1869 Hassan O. KAYA, 4133 Hatice Ataçağ ERKURT, 3471, 3509 Hatice GÖKCEKUS, IX Hatice GÜLEN, 459, 467, 753 Havva Alkan BALA, 4027, 4334 Havva ARSLANGAZİ, IX Havva DINÇ, 345 Hayrünisa BAŞ, 2365 Heila LOTZ-SISITKA, XIV Helen SCHNEIDER, XIV He-lin FU 4597 Henning SCHROLL, 4169 Herdem ASLAN, 439 Heval OCAL, 4741 Hillel S. KOREN, XIV Hilmi ERDAL, 1849 Himmet UMUNÇ, 4557 Hiromi YAMASHITA, XIV Hj. Dahlan TAHA, 2761 Hj. Kamaruzaman JUSOFF, 2761 Holmes ROLSTON, XIV Hosin RANJI, 1925 Hruska JAKUB, XIV Huriye KUBİLAY, 2863 Husnija RESULOVIĆ, 4665 Hussein LAHMAR, 5117 Hülya CICEK, 2099 Hünay EVLIYA, XI Hüseyin AKYÜZOĞLU, 5381, 5391 Hüseyin GÖKÇEKUŞ, II, III, VII, IX, XVII, VIII, XX, XLI, 2923, 4219 Hüseyin KARACA, 4987 Hüseyin ÖZDEŞER, 1243 Hüsnü Ezber BODUR, 5179 Hüsnü KAPTAN, 889



Ι

I. AKKURT, 3551, 3555 I. C. OKORO, 5155 I. DZHYGYREY,4199 I. İSKENDER, 4015 I. STOIMENOVA, 3465 Ibrahim Abdel Gelil Said, ABDULA XI Ioana GOMOIU, 3197 Irena TWARDOWSKA, XIV Irina CHESNOKOVA, 4673 Isaac RAMPEDI, 1161 Isak IDRIZI, 1725, 4093 Isfaq AHMAD, XIV, 3607 Işık K. ORAY, 1481 Işık Özge YUMURTACI, 1527

İ

İ. ÇOK, 3459 İ. Sevinç KRAVKAZ, 241 İbrahim BEKTAŞ, 1931 İbrahim ORUN, 2311 İbrahim S. ALNAIMI, XI İclal ALUCLU, 823 İclal Geyikli MERAM, 2099 İdil ALKAYA, 5269 İdil ALTIPARMAKOĞULLARI, 1379 İlhan ALTINOK, 3267 İlhan SAĞSEN, 4507 İlker KILIÇ, 2845 İlknur AK, 439 İlknur ÖZDEMİR, 2311 İlyas TENLİK, 5357 İlyas YILMAZER, 1275, 4635 İnci TOGAN, 345 İncilay YURDAKUL, 4867 İpek İMAMOĞLU, 1365 İpek YILMAZ, 3059, 4350 Írfan GÜNEY, XI Irfan GÜNSEL, IX Irfan SAYAN, 5063 İsmail GÜNDÜZ, 4677 İsmet ÇOK, 2015 İsmet UYSAL, 571 İsmühan Potoğlu ERKARA, 2333

J

J. ABDOLLAH, 2747 J. ABESHI, 4769 J. F. Santos OLIVEIRA, XIV J. H. EPHRAIM, 3863 J. J. BEZUIDENHOUT, 2701 J. NAJI. 4302 Jaco VANGRONSVELD, XI Jaeweon CHO, 3149 Jalali Seyed GHOLAMALI, 387 James DEVILLERS, XIV James SEGGANE, 689 Jane GOLD, 1071 Janki ANDHARIA, 4695 Jaroslav BOHAC, XIV Jean BALOUGA, 4367 Jeffery J. SMITH, 1125 Jennifer BROWN XIV Jianping WU, XIV Jim C. BRIDEN, XIV Jim LAMEROX, III Joe LEWIS, XI John A. HOSKINS, 1965 John DAISH, XIV John GREGORY, XIV John HOSKINS, XIV John SAKA, XI Joseph S. PAIMPILLIL, 4927 Josephine Phillip MSANGI, 5257 Juan GUZMÁN, 1393, 4975 Judith T. ZELIKOFF. XIV Julian Scott YEOMANS, 11 Jurgis Kazimieras STANISKIS, 1 Jurka Lepicnik-VODOPIVEC, 2575 Jyrki LIESIVUORI, XIV

K

K. A. IBAYEVA, 749 K. ANKUR, 3279 K. OBIRI-DANSO, 3863 K. S. CHO, 3533 K. SWATHI, 4809 K. Tuluhan YILMAZ, 187 Kadriye Deniz TOPÇU, 1411 Kai-Uwe KRAUSE, 3887 Kaku NOKOE, XIV Kamran ZENDEHDEL, 1081 Karen OCEGUERA, 4975 Katerina BISEVA, 2213 Kemal BİRDİR, 1339 Kemal ESENGÜN, 5197, 1849 Kenan ERDOĞAN, 2311 Kenan OK, 3875 Kengo SUNADA, 4067 Kenneth N. TIMMIS, XIV Khalid S. AL-SHALLASH, 1989 Konstantin V. SUDAKOV, III Kou IKEJIMA, 4067 Kriš JOZEF, 4081 Kristine WALRAEVENS, XV Kujtim ZENA, 1725, 4093 Kutalmış GÖKKUŞ, 3081 Kültiğin ÇAVUŞOĞLU, 2139 Kürşad ÖZKAN, 565, 651 Kyaw Tha PAW U, XV Kyoung-Woong KIM, XIV

L

L. DHASKALI, 4769 L. MEKLICHE 493 L. N. Ece ARIBURUN, 1449 L. TAFAJ, 4769 L. V. HUSEYNOVA, 3411 L. V. LIM, 2233 L. Van RENSBURG, 2701 L. YILMAZ, 1801 Laika GÖKÇEKUŞ, 1983 Lale GÜREMEN, 3353 Latifah MANAF, 2675 Laura SHABANI, 4783 Leel RANDENI, 3939 Leila VATANI, 399 Levent AKDUMAN, 4635 Levent ŞIK, 2029 Leyla AÇIK, 761 Leyla KALENDER, 3365 Li MINGYANG, 1113 Lidia V. SMOLOVA, 2485 Lidija VUJIČIĆ. 2569 Liliana VASILIU-OROMULU, 255 Liljana ELMAZI, 1323, 1427, 2123 Ljiljana MALOVIĆ, 3423 Luc HENS, III, XV Luiz Antonio FERRARI, 3517 Lyoussi BADIAA, XI



Μ

M. A. YÜKSELEN, 3213 M. Ali KİRMAN, 5165 M. Aydın PEKİN, 3669 M. AZIMI, 2747 M. B. KHORSHIDI, 675 M. BORHANI, 2747 M. D. HASNAOUI, 2785 M. DUMITRU, 255 M. Erol KESKIN, 4280 M. F. ALTUNKASA, 2917 M. FALAHI, 5421 M. FALCA, 255 M. FRAHPOUR, 2747 M. Ghanbari MOTLAGH, 641 M. GHOLAMI, 5421 M. H. MAHDIAN, 4183 M. Hakan ARSLAN, 4655 M. Hakkı ALMA, 1931 M. Handan ÇUBUK, 1821 M. ISMAILI, 2225 M. KARAMAN, 4007 M. Kemal BESER, 1549 M. KITIS, 3019, 3523 M. KOLUKIRIK, 3227 M. M KAMEL, 3237 M. MAHDAVI, 4647 M. Mohseni SARAVI, 4647 M. Nasir SHAMSUDIN, XI M. Nur EROĞLU, 5365 M. ÖVEZ, 4015 M. R. ASGHARIPOUR, 359 M. S. GÜNEY, 4059 M. Sedat KABDAŞLI, 5037 M. SEHABI, 493 M. SERÍN, 695 M. Shamsher ALI, XV, 2369 M. T. ESETLILI, 2727 M. TABARI, 641 M. Talha GÖNÜLLÜ, 5225 M. TOUJI, 2785 M. UZUNKAVAK, 1767 M. Yaşar KALTAKCI, 4655 M. Zeki DOĞAN, 1515, 1521 M. Zeki YILDIRIM, 411 M. ZGUROVSKIY, 1609, 4199 Macid NURBAŞ, 3051, 3359 Maengsern KIM, 997 Mahir FİSUNOĞLU, 2869 Mahmut MUTLUTÜRK, 1641

Mahmut Parlak TUNA, XI Mahmut SARI, 2527 Mahnaz ZAHEDMANESH, 1925 Majed Hamad Abu ZAHRAH, 2923 Majid Labbaf KHANEIKI, 3929 Majid YASOURI, 4207 Mamdouh NOUH, XV Manfred DENICH, 475 Mannar FAYYAD XI Manuel Benito CRESPO XI Manzoor QADIR, XV Marcel ARNOULD, XV Marcel STIVE, XI Marcial BLONDET, XV Margaret ZIMBA, XI Maria da CONCEIÇÃO, 37 Maria JONSTRUP, 3415 Mariele EVERS, 3887, 3899 Marilena ONETE, 645, 3197 Mark BYNOE, XI Marko KIESSEL, 1021 Martha C. MONROE, XV Martín CERVANTES, 1393 Martin Morgan TAYLOR, 5291 Mary SEELY, XV Maryna YEPIK, 4491 Marzieh MOSAYEBI, 2739 Mayor John WILLIMAS, 5327 Mehmet A. MAZMANCI, 3509 Mehmet AKBULUT, 439 Mehmet Ali TALAT, XXXVII Mehmet BERKUN, 3401, 3991 Mehmet BEYHAN, 851 Mehmet ERDOĞAN, 2421, 2549 Mehmet ERGIN, XV Mehmet İSLER, 2365 Mehmet KARACA, 3679, 3723 Mehmet KARAOĞLAN, 2775 Mehmet KITIS, 3149 Mehmet OKCAN, IX Mehmet ÖZTÜRK, 295 Mehmet TÜRKMENOĞLU, 3961 Mehraj ABBOV, 237 Melih MICIK, 4741 Meltem Kutlu GÜRSEL, 2863 Meltem MARAŞ, 329, 2139 Mesude ISCAN, 345 Mesut ANIL, 3961 Mesut YALVAÇ, IX Mete FERIDUN, 4367 Mete TAYANÇ, 3723 Metin CAN, 5197

Metin ERGENEMAN, 3669 Michael WILHELM, XV Mihaela PAUCA-COMANESCU, 645.3197 Mikayel HARUTYUNYAN, 4237 Mine Uzbilek KIRKAĞAÇ, 587 Minodora STANESCU, 255 Mira LULIĆ, 4915 Mirela MERSINI, 1427 Mohamed AZAB, 4527 Mohamed. M. SHEREIF, 1989 Mohammad Esmaeil ASADI, 1033 Mohammad Reza NAGHAVİZADEH, 627 Mohammad Yousif Al HITY, 2615 Mohsen HOSSEINI XI Mohsen MALEKI. 2739 Mohsen ROSHDI, 1737 Mohsin SHAIKH, 2307 Moneef R. ZOU'BI, XI Moslem AKBARINIA, 399, 2823 Muaaz Mutaz Al-AJLANI, 2243 Muammer TUNA, 2441, 5133 Muhammad AKHTAR, 421 Muhammad Ali SHAMIM, 3687 Muhammad ARSHAD, 4753 Muhammad Azim KHAN, 551 Muhammad Naeem KHAN, 421 Muhammed ATAMANALP, 4318 Muhammet TURKOGLU, 439, 4935 Muhlis ÖĞÜTÇÜ, 2863 Mukesh B. JOSHI, 1617 Murat AYDEMIR, 2549 Murat CETINKAYA, 111 Murat DOĞRUEL, 3723 Murat E. YAZGAN, 955 Murat ERTAŞ, 1931 Murat ŞAHİN, 987 Murat TASDEMİR, 1589 Murat TÜRKEŞ, 3657 Murat ÜNAL, 621 Murat ZENCİRKIRAN, 271 Musarrat JABEEN, 1695, 4425, 5209 Mustafa ALPASLAN, 439 Mustafa AYDIN, 2775 Mustafa CENGIZ, 3027 Mustafa DOĞAN, 3139 Mustafa Dursun ÇAĞLAR, 881 Mustafa IŞILOĞLU, 2365



Mustafa KARABOYACI, 3027 Mustafa N. ILHAN, 2257 Mustafa ÖZER, 1219 Mustafa ÖZTÜRK, 2343 Mustafa ÖZYURT, 3471, 5063 Mustafa TÜRKMEN, 3081, 3089, 3559 Mustafa VAR, 393 Mustafa YILDIRIM, 3059, 4350 Mutasem EL-FADEL, XI Muthana SHANSHAL, XV Muzaffer YÜCEL, 3735 Müberra PULATKAN, 393 Müge BAHÇECİ, 963 Münevver ELELE, 2687 Münir ÖZTÜRK, III, XV, 2935 Müslüm BEYAZGÜL, 2935 Mykola SHESTAVIN, 4491 Myqereme RUSI, 5281

Ν

N. A. BERESFORD, 1953 N. A. SALIMOVA, 3411 N. AYMAN ÖZ, 3227 N. Ç. BEZİR, 1767, 1947, 3555 N. DURKAN, 3595 N. Ferah AKINCI, 829 N. Gamze TURAN, 1665 N. IGNATYEVA 4047 N. KALOYANOVA, 3465 N. KHUSSAINOVA, 2233 N. KONAKLI, 2917 N. N. JIBIRI, 3105 N. O. YİĞİT, 3019, 3523 N. ÖZEK, 1767, 1947 N. ŞAHİN, 695 N. Ülkü Karabay YAVAŞOĞLU, 2029 Nadejda TODODROVA, 1331 Nader YEHIA, 4527 Naim H. AFGAN, XV Naim UZUN, 2603 Nandkishor MORE, 515 Naser AKHONDI, 1737 Naser Jafari GHAVZAN, 4292 Nasreddine SAADOULI, 4264 Nawneet VIBHAW, 2889 Nazan Deniz KOÇ, 4797 Nazım BURGUL, 5371

Nazlı BÖKE, 2029 Nazmi ORUÇ, 881, 889 Nedim GÜRSES, 4859 Nerkis KURAL, 2497 Neslihan SARUHAN, 595 Nesrin ÇİLİNGİROĞLU 2205 Nesrin MENEMENCİ, IX, 5429 Neşet KILINÇER, XI Nezaket ADIGÜZEL, 761 Nezihe KÖKSAL, 467, 753 Nguyen THI HAI YEN, 4067 Nicholas MASCIE-TAYLOR, XV Nicholas ORNSTON, XV Nicolas JARRAUD, 4443 Nihal KUTLU, 595 Nihâl Yıldırım MIZRAK, 1219 Nilay TAŞER, 3313 Nilden BEKTAŞ, 3481 Nilgün BALKAYA, 3481, 3495 Nilgün BİLEN, 2281 Nilgün Göktürk BAYDAR, 4801 Nilgün ÖZDEMİR, 4318 Nilgün ÖZTÜRK, 2333 Nilsun İNCE, 5269 Nilüfer SEYİDOĞLU, 271 Ning ZHOU, 4597 Nives MAZUR, 4915 Norhayati Mohd TAHİR, XV Nuray TERZİ, 1399 Nuray TOKGÖZ, 83 Nurdan ATAMTÜRK, 4551 Nurdan ERDOĞAN, 1535, 2163 Nuri Onur AZİZOĞLU, 1975 Nurkan KARAHANOĞLU, 4105 Nusret ŞEKERDAĞ, 3037, 5075 Nüket SİVRİ, 2275 Nükhet GÜNBEYAZ, 1665 Nükhet YILMAZ TURGUT, XI, 2807 Nüzhet Cenk SESAL, 4797 Nüzhet DALFES, 3679

0

O. BOYACIGİL, 2917 O. EYİCE, 3227 O. G. ARINOLA 2133 O. İNCE, 3227 O. K. ULUTAŞ, 3459 O. KVITKA, 4199 O. M. AKINOSUN, 2133 O. O. OYETAYO 2133 **O. PAVLOVA, 4047** O. SUSAREVA, 4047 Obasohan QUEEN, 5327 Obradović ZAREMA, 2115 Oğuz KURT, 295 Oğuz ÖZDEMİR, 2441 Oksal MACAR, 353 Oktay YILDIZ, 339 Olcay GÜLÇİÇEK, 2793 Olcayto KESKİNKAN, 3043 Olivier BOIRAL, 169 Onur KOYUNCU, 2333 Orhan ALTAN, XI Orhan KÜÇÜKGÜL, 3059 Orhan ÜNAL, 2327 Osman N. ÖZDEMİR, 4463 Osman Nuri ERGÜN, 3601 Osman SÜNGER, 1975 Ozan M. GÖKTÜRK, 3679

Ö

Ö. ÇINAR, 3523 Ö. Faruk TEKBAŞ, 2063 Ömer APAYDIN, 5225 Ömer EKER, 4001 Ömer LÜTFİ ŞEN, 3679, 4965 Ömer Tuğrul KARAGÜZEL, 1881 Öner ÇETİN, 4255

Özcan ÖZEN, 439 Özden AĞRA, 1821 Özgül İNCEOĞLU, 3227 Özgür CENGİZ, 439 Özgür Emek İNANMAZ, 439 Özgür YILMAZER, 1275, 4635 Özlem ESENGİN, 2775 Özlem ŞENYİĞİT, 829 Özlem UNAL, 1339 Özlem YILMAZER, 1275, 4635 Öznur ÖZDEN, 4567



P

P. GÜREL, 4015 P. J. Jansen Van RENSBURG, 2701 P. K. GOGOI, 1195 P. MANOHARAN, 199 P. MUTLU, 695 P. S. SHEHRAWAT, 1141 Pall HERSTEINSSON, XV Paqui BLANQUES, 3415 Parisa NIKZAD, 1925 Patricia MAURICE, XV Paul Ravn JEPSEN, 2387 Paul W. JOWITT, XV Paulo B. LOURENCO, XV Pecora VANESSA, 1685 Pelin AKLIK, 3577 Pernille ALMLUND, 53 Peter BRIMBLECOMBE, XV Peter KRUMBIEGEL, XV Peter NOVAK, XV Petra ADOLFSSON, 1793 Peyman YALÇIN, XI Phil-Eze, 5155 Philip E. LAMOREAUX, XV Philip M. Fearnside, XV Pınar İŞMEN, 439 Pinar KUŞ, 3119 Pranav VYAS, 369

Q

Qamar Shahid SIDDIQUI, 2543 Qarayev Siyavush FARKHAD, 2479 Qasem Abdul JABER XI Qiang LUO, 4597 Qorban ELMI, 4735

R

R. Erdem ERKUL, 4417
R. Esra DEMİRDÖĞEN, 129, 1747
R. K. BAXI, 2307
R. KANANI, 675

R. N. PATI, 1995 R. SOLTANI, 487 R. Süleyman GÖKTÜRK, 2327 R. TIPIRDAMAZ 537 R. ÜNAl, 3551 Rabive TERZİ, 595 Rafet KISTIR, 1641 Rahmi ERDEM, 931 Rahmi KOÇ, XXIII Rahşan TAMSÜ, 1005 Ramazan AKMEŞE, 5357 Ramazan MERAL, 4344 Ramazan ŞEVİK, 305 Ramzi SANSUR, XI Rasa GLINSKIENĖ, 95 Rașit ALTINDAĞ, 1641 Ravi JAIN, XV Raza ALI, 3687 Reha SAYDAN, 1575 Reinhold STEINACKER, III, XI Remzi KARAGÜZEL, 1641 Renee RICHER, XI Richard MOLES, XI Richard R. ERNST, XIII Richard ROBINS, XV Rifat RESATOĞLU, IX Robert GIFFORD, XVI Robert J. LETCHER, XVI Roberto DANOVARO, XVI Romeu ROVAI FILHO, 3517 Rosanna SALVIA, 4109 Roshan T. RAMESSUR, 5021 Rouhi-Moghaddam EINOLLAH, 387 Ruhangiz ISMAILOVA, 1633 Rüstem KIRIŞ, 3747

S

S. A. UTELBAYEVA, 2233
S. AYAN, 501
S. BAŞLAR, 3595
S. BATGI, 1859
S. CLAASSENS, 2701
S. DINEVSKA, 2225
S. DÜZGÜN, 4619
S. Gonca DEPREM, 5365
S. H.R. SADEGHI, 4183
S. HARUTYUNYAN, 4791
S. M. R FATEMI, 5421
S. Mohsen HOSSEINI, 2823

S. P. BINDRA, 5117 S. SAKAR, 1463 S. SAM, 3213 S. SARKAR, 1597, 3279 S. Serkan NAS, 3541 S. STRATIEVA, 3465 S. TAHMİSCİOĞLU, 4007 S. TANIK, 4015 S. Yousefi KHANGAH, 379 Saadet TOKER, 781 Sabri AZGÜN, 1589 Sabri RAZA, 2105 Sabri ŞENER, 1057 Saeed A.K. LODHI, 67 Saeid GORGIN, 581 Saffa B. RIFFAT, XVI Said DAĞDAŞ, 3747 Saime ÖNCE, 83 Salah Y. Awad ALLA, 1255 Salek Zamani ALI, 1573, 2613, 5495 Salek Zamani MARYAM, 1573, 2613, 5495 Salek Zamani YAGHOUB, 1573, 2613, 5495 Salih GÜCEL, IX, 295 Sam KACEW, XVI Sami ÖZÇELİK, 2091 Sanda MAICAN, 255 Sanda Midzic-KURTAGIC, 2387 Sandor KEREKES, XVI Sandra M. APOLINARIO, 1777 Santosh Kumar PRAJAPATI, 2983 Sarp ÜNER, 2187 Satoru OISHI, 4067 Savas AYBERK, 3319 Save Nihan CABUK, 889 Scott SLOVIC, XVI Sebahat K. OZMAN-SULLIVAN, 4741 Sebsebe DEMISSEW, 475 Sedef ELKER, 3127 Sedef ERYİĞİT, 1411 Sefer AYCAN, 2257 Seher Arıkan TEZERGİL, 143 Selahattin GÖKMEN, 3313 Selcen BABAOĞLU, 761 Selçuk KILINÇ, 2343 Selim KAPUR, XI Selma YEL, 4453 Selnur UÇAROĞLU, 3059 Semih EKERCIN, 2657, 2667



Semra ILHAN, 2321, 3097 Semra SOYDAM, 651 Serap YAMAN, 5269 Serdal SAKÇALI, 2935 Serdar ALTINOK, 111 Serkan ÖZDEN, 439 Serkan ÖZTÜRK, 4719 Serkan YILMAZ, 5269 Serpil OPPERMAN, XII, 2375 Servet ARMAC, 1275 Seunghoe CHOI, 997 Seval SÖZEN, XII Sevda ÇALIŞKAN, 2853 Sevgi SARYAL, XII Sevil YALÇIN, 571 Sevim BUDAK, 4399 Seyed Hamidreza SADEGHI, 4727 Seyed Mohsen HOSSEINI, 387 Sezgin CELİK, 557, 565, 2327 Sezginer TUNCER, 439 Shafiqul I. BHUIYAN, XVI Shahamat U. KHAN, XVI Shahida HASNAIN, 2243 Shian-chee WU, XVI Siaka, SIDIBE, XVI Siarhei PAZNIAK, 1673 Sibel ALIOGLU, 2005 Sibel ASLAN, 5075 Sibel BAYIL, 2099 Sibel ULUDAĞ-DEMİRER, 3127 Silva ORLANDO CRISTIANO, 1685 Sílvia Maria STORTINI GONZÁLEZ VELÁZQUEZ, 1685, 1777 Sima NART, 1575 Sinan GÜNEYSU, 2275 Sinan SARISOY, 1549 Sinem AKCALI, 2353 Skender OSMANI, XII Škultétvová İVONA, 4081 Sladjana KLJAJEVIĆ, 3423 Slavka SUFI-MIĆIĆ, 181 Sokefun Olusola BOLARINWA 3343 Solmaz KARABAŞA, 1357 Somlata SHARMA, 3759 Songül Acar VAİZOĞLU, XII, 1975, 2173, 2539, 5357 Sorin STEFANUT, 3197 Sourav KUMAR KESHRI, 4481 St. ALEXIEVA, 3465

Staika STRATIEVA, 1331 Stefan TRESSL, 3887 Stephen P. MC CARTHY, XVI Suani Teixeira COELHO, 1685, 1777 Suat ATES, 439 Suat GÜNHAN, 1473 Suat I. GÜNSEL, IX, XVII Suavi TUNCAY, 5453 Subramanya Sirish TAMVADA, 369 Sujith RATNAYAKE, 3939 Sukhong YOON, 997 Sulejma ČEHIĆ, 3251 Sultan BEKİROĞLU, 4001 Sumana V. PANDEY, 2295 Sungyun LEE, 3149 Suresh Chandra SAXENA, 1313 Süha BERBEROĞLU, 187 Sühevla KIRMIZIGÜL. 2029 Süheyla Sıramkaya BÜYÜKŞAHİN, 917 Süleyman KOCBAS, 2085 Süreyya A. KADIOĞLU, 3187 SV Sven Bienert MRICS, 3707 Svetla BACHVAROVA, 1331 Syed MUZAMMILUDDIN, 1781

Ş

Ş. Doğanay YAYIM, 263
Ş.Gülin BEYHAN, 851
Şafak URAL, XI
Şakir ALEMDAR, IX
Şebnem ELLİALTIOĞLU, 761
Şebnem Önal HOŞKARA, 977
Şennur DABAK, 2075
Sevket DURUCAN, XVI
Şifa ABİK, IX
Şule ELHAKAN, 823
Şükran CIRIK, 439
Şükran ŞAHIN, 1101, 4155
Şükrü GÜNEY, 1833

T

T. C. KUMASİ, 3863 T. GJYLADIN, 2225 T.SCHEYTT, 4059 Tadesse WOLDEMARIAM, 475 Tahsin ERTUĞRULOĞLU, XXIX Tahsin Gökhan TELATAR, 2187, 5365 Tamer ATABARUT, 2287 Tamer İrfan KAYA, 2265 Tamer ŞANLIDAĞ, 2353 Tania FLOQI, 4783 Tarzan LEGOVIC, III, XII, XVI Tayfun KINDAP, 3679 Temel FEHMINAZ, 1975, 2105, 2205, 2539 Teoman KESERCİOĞLU, 637 Tetsuo YUHARA, XII Tevfik ISMAILOV, 1633 Thade CLAMSEN, 249 Theodore A. ENDRENY, 4219 Thomas MADRITSCH, 1293 Tomasz ZYLICZ, XVI Tufan NAYİR. 2343 Tuğba ALP, 3169, 3177 Tuğra İNCEER, 5371 Tuğrul URAL, 2505 Tuluhan YILMAZ, XII Tuncay M. SEVER, 5055 Tuncer KATAĞAN, 5051 Tuncer ÖZDİL, 1379 Turan ÖZTURAN, XII Turgay AVCI, XXX Tülay ÖZDEMİR, 861 Tümer GARİP, IX Türkay YILDIZ, 1527 Türkekul KURTTEKİN, XXXII Tynybekov AZAMAT, 1657

U

U. S.YILMAZ, 4655 Uğur ÖZEKİNCİ, 439 Uğur YILDIRIM, 4399 Ulaş AKIN, 1281 Ulaş İM, 3723 Ulric ROTT, III , XVI Umit GÖKKUŞ, 4995, 5083, 5095, 5105 Umut TÜRKER, III, IX, 2923, 5037



Ü

Ü.Gülsüm TER, 1411 Ülgen BEKİŞOĞLU, 1101 Ümit ERDEM, XII, 2711 Ümit HASSAN, III, IX, XIX Ümit KEBAPÇI, 411 Ünsal AÇIKEL, 3169, 3177

V

V. ALTAY, 695 V.DAVTYAN, 4791 V.H. KABAMBE, 3847 V. M. SARODE, 2037 **V. NIMMIE, 199** V.S.MAZUMDAR, 2307 V.SANDA, 255 V.TOPRAK, 4619 V. V. KOZHANOV, 2233 Vakur SÜMER, 4507 Valentina YANKO-HOMBACH, XII Vedat DOYURAN, III, XVI Vedat TOĞAN, 3991 Vedat TOPRAK, 2631 Veysel GÜLDAL, 3981 Veysi ÖZEL, 5063 Victor G. PRIETO, XVI Vildan GÜNDOĞDU, 2687 Vinil AKBULUT 2105 Vinka UZELAC, 2559 Violeta HOXHA, 4093 Viorica HONCIUC, 255 Vivek P. KAPADIA, 1617 Vladas ŽULKUS, 911

W

W. CHO, 3533 Waleed Khalil ZUBARI, XII Walid A. ABDERRAHMAN, XVI Walter KOFLER, III , XVI William J. MANNING, XVI Wim DE KEYSER, 1081 Wiranto ARISMUNANDAR, XVI

Y

Y. BERİVAN, 839 Y. Bhg. DATO, 2761 Y. DOĞAN, 3595 Y. KURUCU, 2727 Yaakov ANKER, 4121 Yalçın TEPE, 3081, 3089, 3325 Yalçın TÖRE, 3089 Yasemin LEVENTELİ, 1275 Yaşar AVŞAR, 5225 Yavuz Bülent KÖSE, 659 Yavuz GÜNALAY, 11 Yeliz ASCI, 3051, 3359 Yeliz IŞIKLI, 4105 Yesim BÜYÜKATEŞ, 439, 4935 Yeşim Sağ AÇIKEL, 3051, 3359 Yeva TOROSYAN, 4237 Yılmaz İCAĞA, 277 Yılmaz OCAK, 3393 Yigal RONEN, XII Yuan T. LEE,, XIII Yusuf BAYRAK, 4719 Yusuf HÜSEYİNOĞLU, 611 Yusuf POLAT, 1005 Yusuf SERENGIL, 1133, 3875 Yusuf Ziya TER, 941 Yüksel İZCANKURTARAN, 187

Z

Z. CETECIOĞLU, 3227 Z. Damla UÇA AVCI, 4709 Z. DURAN, 871 Z. Fuat TOPRAK, 823 Z. J. MAMMADOVA, 545 Zafer BEKİROĞULLARI, 2591 Zafer DOĞU, 287, 305 Zafer ÖZER, 2793 Zafer YENAL, 5269 Zakia SHOAB, 67 Zalkid HADZIBEGOVIC, 2387 Zehra BAŞARAN, IX Zehra GÜL, 2, 4399 Zekai ŞEN, III, XII, 3623 Zeki KODAY, 4308 Zekirija IDRIZI, 1725, 4093 Zeliha Selamoğlu TALAS, 2311 Zeynel DEMİREL, 2793 Zhang YANG, 3149

Zhihong XU, XVI Zohra Ben LAKHDAR, XII Zuhal DİLAVER, 521 Zulfiqar ALİ, 421 Zülküf KAYA, 3961 Zvjezdana SANDIĆ, 3423


SOME INFORMATION ABOUT NEAR EAST UNIVERSITY

Near East University was established in 1988 and since then has grown to become one of the fastest growing universities in the world setting itself the strategic goal of joining the "top 500 universities in the world".

From 1988 until now, the University has managed to expand its physical infrastructure and improve its quality of education and scientific research to meet international standards. Near East University is a member of the European University Association, the International Association of Universities and the Federation of the Universities of the Islamic World. The University has over 3,000 staff, of which 1,000 are academic personnel. 17,000 students from 53 different countries are attending 14 faculties and more than 60 departments at the university. It has luxury halls of different sizes which in total cover an area of 350,000m² and have the capacity to hold a total of 5,000 people. There are also 14 dormitories with a capacity of 5,000 students, but the construction of new dormitories is also planned.

Near East University has adopted life long education as its main mission. Thus, we begin with our Kindergarten, Junior College and Secondary High School which have a total number of 2,000 students. The faculties and departments offering undergraduate and graduate degrees are as follows:

FACULTIES

- 1. Faculty of Architecture
 - Architecture
 - Interior Design
- 2. Faculty of Arts and Sciences
 - English Language & Literature
 - Mathematics
 - Turkish Language & Literature
 - Psychology
- 3. Faculty of Economics & Administrative Sciences
 - Banking & Finance
 - Business Administration
 - Computer Information Systems
 - Economics
 - European Union Relations
 - Human Resources Management
 - International Business
 - International Relations
 - Marketing
 - Political Sciences
 - Information & Records Management



- 4. Faculty of Communication
 - Radio-Television-Cinema
 - Motion Picture Production
 - Journalism
 - Public Relations & Advertising
- 5. Atatürk Faculty of Education
 - English Language Teaching
 - Computer & Teaching Technologies
 - Pre-school Teaching
 - Elementary Teaching
 - Turkish Language Teaching
 - Guidance & Psychological Counseling
 - Human Resources
 - History Teaching
- 6. Faculty of Engineering
 - Civil Engineering
 - Computer Engineering
 - Electrical & Electronic Engineering
 - Mechanical Engineering
 - Biomedical Engineering
- 7. Faculty of Fine Art & Design
 - Graphic Design
 - Plastic Arts
- 8. Faculty of Maritime Studies
 - Department of Deck
 - Maritime Management
 - Marine Engineering
- 9. Faculty of Law
 - Law
- 10. Faculty of Performing Arts
 - Dramaturgy & Dramatic Authorship
 - Acting
- 11. Faculty of Pharmacy
 - Pharmacy



- 12. Faculty of Dentistry
 - Dentistry
- 13. Faculty of Health Sciences
 - Nutrition and Dietetics
 - Nursing

14. Faculty of Medicine

SCHOOLS

1.School of Physical Education & Sports-Coaching Education-Physical Education and Sports Teaching-Sports Administration

2.School of Tourism & Hotel Management -Tourism & Hotel Management

3. School of Maritime-Deck-Marine Engineering-Maritime Management

INSTITUTES

-Institute of Education Sciences
-Institute of Sciences
-Institute of Social Sciences
-Institute of Health Sciences

With the opening of the NEU Grand Library in December 2005, the University has passed a new and critical mileage stone entering truly the information age. The Grand Library is fully computerized and linked to many major world libraries and research institutions throughout the world. The library has a collection of more than 600,000 printed materials and access to more than 110 million electronic articles. The library has recently been elected as the central library for the Turkic world and now serves universities of several different countries such as Azerbaijan, Kyrgyzstan and Turkmenistan. The library is open 24 hours a day serving not only the university but the whole community.



The University has until now organized 14 International Conferences & Congresses and many local and regional conferences, seminars and panel discussions on a variety of subjects. Near East University believes that the role of the University is not merely to provide formal education but to establish close relations with the wider community. As such, it places special emphasis on strengthening and developing campus-community relations. The University set up a Lifelong Education Centre (YABEM) which provides a wide variety of adult education courses. The University also makes the use of its facilities for cultural, sports and recreation activities available to the public.

As you can see, NEU is one of the fastest growing Universities of the world. The last two years has been devoted towards Health Sciences. This year, we began education in the Faculty of Dentistry, Faculty of Pharmacy and Faculty of Health Sciences. Another important improvement that has been made in our university regarding Health is that in September 2008, education has begun in the Faculty of Medicine. The Faculty of Medicine Research Hospital will be opened in July 2009. The Hospital will have a capacity of 500 beds with a 4,5000m² closed area. The faculty will be giving full service but a special emphasis will be given to researches on Oncology and Cardiology.

NEU does not have boundaries in development. Therefore, a protocol was signed with IBM International in June 2007 for the construction of the NEU Innovation Centre. The building having a closed area of 8,500m² was opened last year. It consists of 3 sections: NEU-IBM Innovation Centre, NEU-IBM Advanced Research Centre and the NEU Technopark. The 'super computers' used in the building have a capacity of 12 trillion processes per second. The research areas consist of Global Warming, Earthquake Stimulation, Defense Research (military), Space Research, High Physical Energy, Nanotechnology and Biotechnology research and product design, Medical, Pharmaceutical, Microbiological, Health Science and Social Sciences. NEU Innovation Centre is unique with its facilities in Eastern Europe, Middle East, Central Asia and Northern Africa.



BRIEF INFORMATION ABOUT TURKISH REPUBLIC OF NORTHERN CYPRUS

History: Cyprus has been occupied successively by Assyrians, Babylonians, Egyptians, Persians, Romans, Lusignans and Venetians who have sought the island's wealth of minerals and timber since the 8th century BC. The Ottoman Empire conquered the island in 1571 and ruled it until the island was leased to the British Empire in 1878. In 1963, the Republic of Cyprus was established by the Turkish Cypriot and Greek Cypriots, based on political equality. The Turkish Cypriots were forcefully ejected from the state mechanism in 1963. Intercommunal clashes which broke out in 1960 continued until 1974. A military coup by Greece in 1974 aiming to annex the island to Greece was aborted by the intervention of Turkey, which was one of the Guarantor Countries. Following the Exchange of Populations Agreement in 1975, Turkish Cypriots moved to the north and Greek Cypriots moved to the south of the island. Consequently, the Turkish Cypriots established their own administration and in 1983, the Turkish Republic of Northern Cyprus was proclaimed.

Negotiations between the two sides under the auspices of the UN started in 1968, with the aim of finding a comprehensive settlement in Cyprus. The latest negotiation process came to an end when the compromise plan, Annan Plan, prepared by the then UN Secretary General Kofi Annan, was overwhelmingly rejected by the Greek Cypriot people. During the referendum held on 24 April 2004, whilst 65% of the Turkish Cypriots voted "Yes", 75% of the Greek Cypriots voted against the plan; thus, eliminating the possibility of establishing a new partnership republic. Despite their obstructionist attitude, the Greek Cypriot administration unilaterally entered the European Union under the usurped title of the "Republic of Cyprus", on 1 May 2004. The then UN Secretary General Kofi Annan, expressed his regret and noted that "he hoped ways would be found to ease the plight in which the (Turkish Cypriot) people find themselves through no fault of their own" (24 April 2004). In his report to the Security Council, he called upon the international community to "cooperate both bi-laterally and in international bodies to eliminate unnecessary restrictions and barriers that have been the effect of isolating the Turkish Cypriots and impeding their development" (S/2004/437). The current UN Secretary General Ban Ki-moon also referred to the economic and social isolation of the Turkish Cypriot people in his report to the UN Peacekeeping Force in Cyprus (UNFICYP) in December 2007, pointing out that promoting the development of the Turkish Cypriot people would make the reunification of the island "occur in as seamless a manner as possible." Observing the injustice against the Turkish Cypriots, who have been experiencing all kinds of inhuman restrictions for years, the EU also expressed its will to enhance the economic development of Turkish Cypriots through an aid package. The EU Commission adopted a proposal, which had foreseen the transfer of 259 million Euros financial aid. However, the Turkish Cypriots have not been effectively benefiting from the EU aid due to Greek Cypriot administrations' pressures.

After the Presidential elections in February 2008 on the Greek Cypriot side, President Mehmet Ali Talat has reiterated once again his readiness for a new process of full-fledge negotiations and expressed his sincerity towards a solution.



Places to visit: In Lefkoşa (capital): Selimiye Mosque, Mevlevi Museum, Sultan Mahmut Library, Dervish Pasha Mansion and Lapidary Museum. In Gazimağusa: Antique Ruins of Salamis, Kantara Castle, Othello Castle, Lala Mustafa Paşa Mosque, Canbolat Museum, Ruins of Ayios Philion, St. Barnabas Icon Museum and Apostolos Andreas Monastry. In Girne: Kyrenia Castle, Bellapais Abbey, St. Hilarion Castle and Buffavento Castle, and in Güzelyurt: Soli Ruins, St. Mamas Monastry and Vouni Palace.

Nature: North Cyprus hosts over 1,600 plant species (22 are endemic), 350 species of birds (7 are endemic), and there are 26 different species of reptiles and amphibians. Every year, 250 different kinds of birds, around 100 million, migrating from Europe to Egypt pass through North Cyprus. The country also became home to some 50 different varieties of butterflies. Visitors are amazed to see that there are 30 different varieties of orchids on the island, 7 of them unique to North Cyprus. Rich underwater plant life and 200 different types of fish are making the blue Mediterranean waters attractive for sea lovers. 30% of the turtles in the Mediterranean, amongst them Carretta Caretta, Chelania Mydas (Green Turtle) and Dermachelys Corniacea, come to the coasts of North Cyprus for breeding.

Life-style, Culture: Turkish Cypriots are well-educated, social and hospitable people. North Cyprus is popular with its handicrafts, cuisine, traditional music and folk dancing. The Turkish Cypriot Cuisine is famous for its kebab dishes and starters called "mezes". Daily fresh fish, meat, vegetables and fruit used in the Turkish Cypriot cuisine make the dishes both tasty and healthy. Local alcoholic drinks include rakı, brandy and red and white wine. Baklava, kadayıf and katmer are deserts favoured by most and Turkish Coffee is a must at the end of every dinner. The cultural and art facilities make the country attractive both for the tourists and foreign students. During the hot summer months, people prefer to relax by the sea whereas during the fall season, people go on picnics and long walks in the mountains and countryside. Indoor activities like exhibitions, cinemas, theatres and concerts are always available.

Electricity: 240 volts A/C. 50 Hz.

Traffic: Driving is on the left and international traffic and road signs are used. Maximum speed on highways is 100 km/hr. Vehicles entering North Cyprus must be insured upon arrival. Please refer to the Turkish Embassy or TRNC Representative Office in your country to check visa requirements.

Climate: North Cyprus enjoys a Mediterranean climate with long, dry summers and short wet winters. The average annual temperature is 19°C. The weather in winter is very mild with temperatures ranging between 9°C-12°C. Average annual rainfall is 500mm.

Emergency telephone numbers: Fire 199, Police 155, First Aid 112





NEAR EAST UNIVERSITY





















