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Edited by Prof.Dr. Hüseyin Gökçekuş

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Environment: Survival and Sustainability

19-24 February 2007 Nicosia-Turkish Republic of Northern Cyprus

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Near East University, Nicosia-Northern Cyprus

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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



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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



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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. Günşel
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 Gökçekeş
Vice Rector of the Near East University



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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.



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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.



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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 multi-disciplinary 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.



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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.

Thank you.



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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. Sıdıka 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.



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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.



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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.

Thank you.



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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.

Thank you.



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Asım VEHBİ
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 losses from human economic activities were forest cover and 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 lose biodiversity in the environment. It is stated that every year we are losing at least 50 different species of live food 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



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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.



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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.

Thank you.



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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 İ. 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 academican 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



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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.

Thank you.



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Türkekul KURTTEKİN
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



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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.

Thank you.



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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 come 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.

Thank you.



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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.



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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.



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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.



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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.



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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.



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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 over-consumerism 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.



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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



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PROTECTED ECOLOGICAL AND FISHING ZONE IN THE REPUBLIC OF CROATIA AND ENVIRONMENTAL PROTECTION

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Based on Article 1024 of the Maritime Code of the Republic of Croatia (1994), and in accordance with Article 55 of the United Nations Convention on the Law of the Sea (1982), the Croatian Parliament has adopted the Decision on the Extension of the Jurisdiction of the Republic of Croatia in the Adriatic Sea at its session of October 3, 2003. By that Decision, and in accordance with Part V of the United Nations Convention on the Law of the Sea (1982), the specific regime of the so-called Ecological and Fisheries Protection Zone (EFPZ) of the Republic of Croatia was proclaimed. The Decision has caused big controversies in Croatia, as well as between interested neighbouring states and beyond. In other words, due to political reasons and pressures the Croatian authorities have abandoned the declaration of the Exclusive Economic Zone (EEZ), which would have been completely in accordance with International Law of the Sea norms, and given this regime a special and unique name - Ecological and Fisheries Protection Zone. When the Maritime Code was passed (1994), the regime of the EEZ was foreseen in Chapter IV, but its declaration was delayed until the decision of the Croatian Parliament. The content of the EFPZ refers only to the sovereign rights for the purpose of exploring and exploiting, conserving and managing the living natural resources of the waters beyond and adjacent to the Territorial Sea and jurisdiction with regard to marine scientific research and the protection and preservation of the marine environment. One of the key reasons for the declaration of the EFPZ is definitely a great concern due to the endangerment of the living resources in the Adriatic Sea and the fear of the recent increasing non-Adriatic and non-Mediterranean fishermen's pressure, including the use of so called ships-factories. The problem of illegal, unregulated and unreported fishing is especially serious. The whole variety of the living resources is excessively being used in the Adriatic Sea, and there is no adequate application of planning, limiting and surveillance of fishing in the part under the regime of the high seas. This tendency endangers the optimal utilization of the living resources, which affects not only the interests of the Republic of Croatia but also other Adriatic states. In case of damage on any ship carrying dangerous or harmful substances, coastal states have the right to intervene only after the accident. After proclaiming the EEZ the coastal states have the right to stop ships to prevent a catastrophe if the ships are considered to carry a potentially dangerous freight. Therefore, it is necessary for all the coastal states in the Adriatic Sea to proclaim their own EEZ. In the end, the Adriatic Sea is a closed and semi-closed sea according to the definition in Article 122 of the United Nations Convention on the Law of the Sea (1982), and due to its small dimensions the consequences of maritime environment pollution could be great and serious.



Introductory notes

The Maritime Code of the Republic of Croatia (1994) in Chapter IV, Articles 32 to 41, contains provisions on the Exclusive Economic Zone (EEZ) of the Republic of Croatia. In Article 1042 of the Maritime Code of the Republic of Croatia it is defined that the provisions from Chapter VII on the EEZ will be applied only if the Croatian Parliament decides to proclaim an EEZ. The decision on the proclamation of the EEZ of the Republic of Croatia has been being constantly delayed for years, despite not only the pressure of Croatian fishermen but the Croatian public in general. During the era of the former state, the Socialist Federative Republic of Yugoslavia (SFRY) never proclaimed such a zone due to various political reasons, especially due to unwillingness to disturb good relations with Italy, even though the SFRY did ratify the United Nations 1982 Convention on the Law of the Sea (UNCLOS). The Republic of Croatia as one of the successors of the SFRY and the state that has control over the biggest part of the Adriatic Sea, has been also avoiding doing so since becoming independent.

However, a certain legal regime has been proclaimed. Based on Article 1024 of the Maritime Code stated hereinabove, and in relation to Article 55 of the 1982 UNCLOS, the Croatian Parliament passed the Decision on the Extension of the Jurisdiction of the Republic of Croatia in the Adriatic Sea at its Session of October 3, 2003¹. Due to the fact that Slovenia and Italy expressed their dissatisfaction with the proclamation of the EEZ, the Republic of Croatia has proclaimed a worldwide unique legal regime on the sea. Instead of proclaiming the EEZ, Croatia has proclaimed the Protected Ecological and Fishing Zone (PEFZ). That expression is not stated in the 1982 UNCLOS at all. The Decision defines that the legal regime of the PEFZ will come to force 12 months after its establishment.

The Decision explains that the Croatian Parliament «hereby proclaims the content of the EEZ related to the sovereign rights for the purpose of exploring and exploiting, conserving and managing the living resources beyond the outer limits of the Territorial Sea, as well as the jurisdiction with regard to marine scientific research and the protection and preservation of the marine environment»². If necessary, the Croatian Parliament has the "right to proclaim, when it deems appropriate, the other elements of Chapter IV of the Maritime Code of Croatia, in accordance with the United Nations Convention on the Law of the Sea"³.

¹ Odluka o proglašenju jurisdikcije Republike Hrvatske u Jadranskom moru (Decision on the Extension of the Jurisdiction of the Republic of Croatia in the Adriatic Sea) October 3, 2003, Official Gazette 157/03.

² Section 1, *ibidem*.

³ Section 2, *ibidem*.



What are the reasons for the proclamation of the EEZ? First of all, a great concern that the living resources in the Adriatic Sea are seriously endangered. In the past several years the fishing pressure of non-Mediterranean States has been growing. The excessive exploitation of the living resources of the Adriatic Sea relating to the impossibility of planning, restricting and controlling the fisheries, mostly occurs in the part of the Adriatic Sea under the high seas regime, which is under the jurisdiction of none of the neighbouring coastal state. That has endangered the optimal utilization of the living resources of the Adriatic Sea and their exploitation. The practice of preventing illegal, unregulated and unregistered fishing in the Adriatic Sea is not only an interest of the Republic of Croatia but of all other Adriatic states.

In the Report submitted by an expert group founded by the Croatian Government in 2003, there is the information that the Adriatic Sea living resources and ecology have been seriously endangered. Scientific researches confirm the seriousness of the situation. Moreover, in the last 50 years the quantity of the living resources in the Adriatic Sea has been reduced to 1/3 due to severe fishing which has nothing to do with the long-term interests of the Republic of Croatia⁴. One of the national interests of the Republic of Croatia is to preserve traditional fishery. It is simultaneously one of the prerequisites for the development of tourism, preserving our marine culture and preventing local population from leaving the islands. Instead of exclusivity concept (EEZ) there is a protection concept (PEFZ)⁵.

Furthermore, since the Adriatic Sea is a small and shallow sea, with the slow circulation of sea currents, the effects of possible pollution could be fatal and their proportions could be bigger than in most of the other seas. Any serious damage could bring to a huge devastation of the living resources. Such damages could have serious negative consequences for this part of the Mediterranean, and considering the traffic density in the Adriatic Sea they are very likely to happen. Pollution can be caused by recklessness or negligence in the navigation but also by unconscientious and careless ship management and other wrongful act. For instance, in case of damage of any ship carrying hazardous substances or in case of risk of pollution caused by ballast water, the coastal states have the right to intervene only after the damage has happened. By proclaiming the EEZ the coastal states obtain the right to stop ships if they are found potentially dangerous according to their cargo, i.e. the states may act preventively to stop the catastrophe. When it comes to tank damage in the high seas, a coastal state may act only after the tank has sunk, while in case of threatening damage within the EEZ regime, the coastal state has the right to provide protection and convoy for such a ship. Therefore, it is necessary for all the coastal states in the Adriatic Sea to proclaim an EEZ.

⁴ The Report of the Croatian Parliament, "The Establishment of Ecological-Fishing Zone", The survey of the 37th session of the Croatian Parliament held in September and October 2003, page 7.

⁵ See more detailed ibidem, page 7 and further on.



By proclaiming the Protected Ecological and Fishing Zone, Croatia primarily acquires sovereign rights for the purpose of exploring living natural resources in the sea, an effect of which would be the exclusion of foreign fishing in the Croatian part of the Adriatic Sea. In such cases, foreign fishermen would have the right to fish only after concluding international agreements based on Chapter V of the UNCLOS. Consequently, the Croatian part of the Adriatic Sea would not be affected by the high seas freedoms (Article 87 of the UNCLOS). It is especially important to emphasize that the protection of marine environment, conservation measures, improvement and optimal utilization of the living resources in this part of the Adriatic Sea would be under the Croatian jurisdiction. The rights and obligations of the Republic of Croatia would include defining (surplus of) the allowable catch of living resources based on scientific data.

The aim of the issue is not only to prevent living resources from being endangered by over-exploitation in the Adriatic Sea, but also to keep fish stocks at the level at which their reproduction would not be seriously threatened. States are obliged to respect conservation and management laws and regulations of a coastal state in its protected zone. By the Decision on the Expansion of the Jurisdiction the Croatian Parliament has particularly pointed out that within the PEFZ all states shall enjoy freedoms, as guaranteed under international laws, of navigation, overflight, laying submarine cables and pipelines, and other internationally lawful uses of the sea⁶.

The Decision of the Croatian Parliament from June 3, 2004 represents the turning point of the issue. It delayed the application of the provisions of the PEFZ for all the EU member-states: «For all the EU member-states, the application of the legal regime of the Protected Ecological and Fishing Zone of the Republic of Croatia shall follow the conclusion of the Agreement on Partnership in Fishery between the European Union and the Republic of Croatia»⁷. Moreover, since the Republic of Croatia has improved its relations with the EU, and the harmonization of legislation and practice with the European standards is one of the Croatian interests, the Decision on the PEFZ is not abolished but only delayed considering the EU member-states. The decision faced a strong public disapproval in Croatia, because the most frequent intruders of the Croatian sea had been Italian and Slovenian fishermen. Furthermore, the delay has denied the purpose of proclaiming the PEFZ since it will be practically applied only to Montenegro which has got an insignificant fishing fleet anyway. The fact that Italy possesses a fishing fleet which is 20 times bigger than the Croatian fleet, speaks for itself. By doing so, Croatia discriminates against the fishing fleets of countries outside the EU.

⁶ Item 4, Decision on the Extension of the Jurisdiction of the Republic of Croatia, loc. cit., footnote 1.

⁷ The Decision on Amendment of the Decision on the Extension of the Jurisdiction of the Republic of Croatia in the Adriatic Sea, the Session of the Croatian Parliament held on June 3, 2004, Official Gazzette 77/04.



Delimitation of the Protected Ecological and Fishing Zone with Opposite or Adjacent Coasts
The limits of the Croatian PEFZ must not cross the delimitation line with Italy and Montenegro (Slovenia does have a direct approach to the high seas). Delimitation shall be carried out in accordance with Article 74 of the 1982 UNCLOS. Since Italy is located opposite to Croatia, Croatia cannot proclaim the maximal allowed width of the EEZ of 200 miles. That way Croatia fulfils the criteria for “states with an unfavourable geographic position”. After proclaiming the EEZ, the precise delimitation of the EEZ with Italy and Montenegro is to be determined as agreed. The delimitation of the future Italian and Croatian EEZ seems to be least disputable, especially from the Croatian point of view. In the Decision on the Extension of the Jurisdiction of the Republic of Croatia in the Adriatic Sea (2003.) it is especially emphasized that "The outer limit of the Protected Ecological and Fishing Zone of the Republic of Croatia shall be determined through the delimitation agreements with the States whose coasts are opposite or adjacent to the Croatian coast.

Until concluding international delimitation agreements, the outer limits of the Protected Ecological and Fishing Zone of the Republic of Croatia shall temporarily follow the delimitation line of the continental shelf established under the 1968 Agreement between the SFRY and the Italian Republic on Delimitation of the Continental Shelf and, in adjacent delimitation, the line following the direction of and continuing the provisional delimitation line of the territorial seas, as defined in the 2002 Protocol on the Interim Regime along the Southern Border between the Republic of Croatia and Serbia and Montenegro⁸. There is no reason that the delimitation of continental shelves, determined by the Agreement between the Italian and Yugoslav Government, signed in Rome in 1968 (due to the fact that this Agreement is based on the succession and is still bounding for both states), do not become the future limit of the EEZ⁹. The Agreement on the Delimitation of the Continental Shelves (1968) states Article 74 para 4 of the UNCLOS (1982): “Where there is an agreement in force between the States concerned, questions relating to the delimitation of the exclusive economic zone shall be determined in accordance with the provisions of that agreement.”. That would determine a unique limit for both legal regimes - the EEZ and continental shelf. In case of proclaiming the EEZ, the outer line of the Croatian EEZ must not cross the outer limit of the continental by the 1968 Agreement.

⁸ Section 6, *ibidem*.

⁹ On the delimitation in the Adriatic Sea. See, for example, Vladimir Ibler: *Medunarodno pravo mora i Hrvatska*, Barbat, Sveucilista knjiznica, Zagreb 2001.; Vladimir Ibler: *Drzavna granica na moru izmedu Republike Hrvatske i Republike Slovenije*, Zbornik Pravnog fakulteta u Zagrebu 44 (1994), pp. 469-478.; Vladimir Ibler: *Uz pitanje lateralnih granica Republike Hrvatske na moru*, Znanstveni skup "Granice na moru", Split, January 20, 1998, Zbornik radova Pravnog fakulteta u Splitu, 35 (1998), pp. 693-697.; Vesna Baric-Punda: *Granice Republike Hrvatske na moru*, Zbornik radova Pravnog fakulteta u Splitu, 35 (1998), pp. 731-741.; Vesna Baric-Punda i Mira Lulic: *Prikaz pojedinih odredbi o gospodarskom pojasu u nacionalnim propisima*, Zbornik radova Pravnog fakulteta u Splitu, 36 (1999), str. 103-112.; Mira Lulic: *Gospodarski pojas s posebnim osvrtom na nacionalna zakonodavstva*, magistarski rad, Pravni fakultet Sveucilista u Splitu, 1999; etc.



Legal regimes on the Slovenian and Bosnian sea are not in touch with the part of the Adriatic Sea under the regime of the high seas, so, accordingly, the countries cannot take part in the delimitation of the EEZ in the Adriatic Sea. Moreover, there is no state in the Adriatic Sea that has valid legal reasons to confront either the proclamation of the EEZ or the 1968 Agreement on the Delimitation of the Continental Shelves. However, as a response to the Croatian proclamation of the PEFZ, the Slovenian authorities have proclaimed their ecological zone and continental shelf. In October 2005 the Slovenian Parliament passed the Act Declaring the Ecological Protection Zone and Epicontinental Zone of the Republic of Slovenia (22 October 2005)¹⁰. Still, that Act is in contradiction with international laws and utterly unfounded because Slovenia has no contact with the high seas which is prevented by the Italian and Croatian territorial sea. As it has no approach to the high seas, Slovenia can proclaim neither an EEZ nor a continental shelf. Accordingly, the Act represents clear territorial pretensions towards the Republic of Croatia.

Finally, in January 2006, the Republic of Slovenia passed a controversial decision in contradiction with international laws, which represented the proclamation of "the sea fishing area of the Republic of Slovenia"¹¹. The area is divided into 3 zones: Zone A – the entire Bay of Piran, Zone B – territorial sea, Zone C – fishing zone and zone of the high seas. The Decision formally confirmed Slovenian territorial pretensions towards the Republic of Croatia because Slovenia unilaterally took possession of the part of the Croatian territorial sea. The Croatian Ministry of Foreign Affairs handed a protest note to the Slovenian Embassy against the Decree on Designation of the Sea Fishing Area of the Republic of Slovenia where this Slovenian Decree was described as «unacceptable, legally unfounded and worthless»¹². Besides being in contradiction with international laws and relations, including the principles of the EU, the Slovenian Decree is not in accordance with the Joint Statement on Avoiding Incidents adopted on the Brioni Islands on June 10, 2005. The Statement was signed by the Croatian and Slovenian ministers of foreign affairs, Grabar-Kitarovic and Rupel, and it was agreed that "both countries shall avoid any kind of incidents that could affect the solution of the issue.

The Adriatic Sea and Pollution Danger

The Adriatic Sea spreads over the area of 138,595 km², its length equals 783 km. The average width is 248 km, max. width 355, and min. width 102 km. The average depth is 251m, and the deepest point lies 1,233 m under the sea. Croatia stretches over the area of 56,542km², out of which the territorial sea comprises 31,067 km². The area of the PEFZ ranges from 23,000 to 25.000 km². The Republic of Croatia has got 1185 island, the coastal length including land and islands equals 58,935 km, and the borderline at sea equals 978 km. There are three national parks in that area and over 100 protected and preventively protected archaeological sites. The Adriatic Sea is a small sea and every kind of pollution can have fatal consequences for the sea and marine environment, fishing, tourism and marine culture of the coastal states.

¹⁰ Zakon o razglasitvi zascitne ekoloske cone in epikontinentalnem pasu Republike Slovenije (Act Declaring the Ecological Protection Zone and Epicontinental Zone of the Republic of Slovenia), Official Gazette RS 93/2005.

¹¹ Uredba o določitvi območja ribolovnega morja Republike Slovenije (Decree on designation of the sea fishing area of the Republic of Slovenia), Official Gazette RS 2/2006.

¹² The Ministry of Foreign Affairs and European Integration of the Republic of Croatia, Public announcement no 1/06, January 6, 2006.



The Mediterranean Sea, as a semi-closed sea, is only refreshed by water coming through the Strait of Gibraltar (6 to 12 nautical miles wide) and is, therefore, particularly sensitive to pollution. It is estimated that it takes 50 to 150 years for the Mediterranean water to be replaced by fresh water¹³. Experts point out the fact that the pollution of the Mediterranean is becoming greater and more serious. Pollution comes mostly from land, but there are other sources (ships, sinking, from the air or through the air, due to underwater activities, etc.)¹⁴.

The aggravating circumstance is the fact that as many as six states have their coasts located on such a small sea – Italy, Slovenia, Croatia, Bosnia and Herzegovina, Montenegro and Albania.

The Adriatic Sea comprises approximately 1/20 of the area of the Mediterranean Sea. 1/3 of the fresh water from the entire basin flows into it as well as waste water from highly developed agriculture which uses chemical fertilizers to a great extent; then, there is an excessive concentration of cattle industry located along the main waterways. As much as 40% of waste waters from the entire Italian territory end up in the Adriatic Sea. The Italian coast is facing an exponential increase of civilian and industrial facilities, which affects soil porosity, while the concentration of the population in the main urban areas is constantly increasing too¹⁵. The phenomenon of eutrophication has contributed to the reduction and extinction of many species in the last decades, while the release of ballast water has enabled the colonization of allochthonous species, constant stress and the reduction of biomass and biological diversity¹⁶.

Sea currents enter the Adriatic Sea from the Mediterranean Sea and move along the Croatian coast to the northern Adriatic Sea, turn around, return along the Italian coast and leave the Adriatic Sea through the Strait of Otranto. The sinking of only one oil tank could have fatal effects for the coastal states considering fishing, tourism and other branches and activities closely related to the sea. The pollution of the Adriatic Sea will not be dispersed throughout the sea but it will pollute the coast and cause a great ecological and economic catastrophe.

¹³ Maja Sersic: *Medunarodno-pravna zastita morskog okolisa*, Pravni fakultet Sveucilista u Zagreb, 2003, p. 60.

¹⁴ Ibidem. See also Pravo okolisa, ed. Loncaric, Horvat, Cvitanovic, Gliha, Josipovic, Medvedovic, Omejec, Sersic, Organizator, Zagreb, 2003; Maja Sersic: *The Crisis in the Eastern Adriatic and the Law of the Sea*, *Ocean Development and International Law*, 24, 1994, pp 291-299.; Maja Sersic: *The Exclusive Economic Zone in the Adriatic*, in Pozar-Domac A. (ed.), *Responsible Coastal Zone Management - The Challenge of the 21st Century*, Periodic biol., 102(1), 2000, pp. 173-180; Maja Sersic: *Agenda 21 and its Application to Enclosed or Semi-enclosed Seas: The Mediterranean and the Adriatic Sea*, *Ambiente Mediterraneo e sviluppo sostenibile*, Atti del XII Convegno internazionale 'Mare e Territorio?', Agrigento, 20-22 ottobre 1994, Quaderno N. 60, Agrigento 1994, p. 145.

¹⁵ Ibidem.

¹⁶ Ibidem.



The northern Adriatic Sea is particularly sensitive to pollution due to its shallow water and poor water circulation¹⁷. Moreover, in that area there are many sources of pollution without a systematic cleansing of waste waters. The area of northern Adriatic Sea is characterized by heavy sea traffic, which is the consequence of the presence of the two biggest Italian ports for oil turnover – Trieste and Venice, then the Port of Marghera, the Slovenian Port Koper, the Croatian Port Rijeka, the Oil Terminal in Omisalj on the Island of Krk, and the terminal for liquefied natural gas in the village of Porto Viro in the Po Delta, which is under construction¹⁸.

Experts find the controversial project "Druzba Adria" very harmful to Croatia according to many aspects, especially from the ecological and economic point of view. It is an international project for the export of Russian oil to the world market through the oil pipeline systems of "Druzba" and "Adria", in the length of 3,200 km, from Samara in Russia via Belarus, Ukraine, Slovakia, Hungary and Croatia to the Croatian Port of Omisalj and the Oil Terminal Omisalj on the Island of Krk. The Croatian experts and public are especially embittered over the construction of the Terminal for Storing and Reloading Oil in the Port of Omisalj. The Project is very risky and obviously does not guarantee a big financial profit. It seems that Croatia has more financial benefit from tourism than from this project. In the end, the contractual guarantees are not sufficient for repairing possible damages.

The problem of waste and ballast water disposal considering oil tanks and ships from other seas and oceans, represents a great danger for the Adriatic Sea since those vessels could carry particles of different chemical and biological systems. It could initiate the development of foreign biological species in the Adriatic Sea, which could affect the ecosystem. Ballast water is necessary for the navigation of empty tanks and its release is inevitable (unlike damages which are a potential danger).

¹⁷The coasts of the northern Adriatic Sea are the centre of one of the biggest tourist basin in Europe, which is characterized by a great concentration of human activities and mass tourism in a very small area, and by an uncontrolled expansion of ports for nautical tourism. The most intensive fishing activities in the entire Mediterranean are going on in the Adriatic Sea. An increase of fishing intensity has brought to serious problems in that sector. See Protocol Adriatic Greenet: International alternative forum of the northern Adriatic – the invitation for all the regions and governments to be involved in the future of the Adriatic, Piran, 2006.

¹⁸ Ibidem.



Croatian Professional Coordinating Body for the Surveillance of the Adriatic Sea

Since the Republic of Croatia acquires another 25,000 km² by proclaiming the PEFZ, i.e. the total area would span over 50,000 km², it is necessary to establish a new mechanism for controlling international and internal regulations of the Republic of Croatia in the Adriatic Sea. Therefore, a "Professional Coordinating Body for the Surveillance of the Adriatic Sea" has been established and its task shall be to have an integrated control over the area under the sovereignty and jurisdiction of the Republic of Croatia. The body shall consist of representatives from various Ministries, e.g. the Ministry of the Sea, Internal Affairs, Police, Agriculture, Defence, Environment, Finances and Culture. The employers of the Ministry of Internal Affairs shall control the Croatian sovereignty, the fishing inspectors of the Ministry of Agriculture fishing equipment and catch on vessels;; the Ministry of the Sea, Tourism.

Transport and Development and port authorities shall control the safety of navigation and public documents.

The Ministry of Defence shall control the Croatian sea also from air. The custom officers of the Ministry of Finance shall also participate in the surveillance including the National Maritime Rescue Coordination Centre, and finally, Croatian fishermen and navigators who usually report possible irregularities. There are approximately 90 boats, 15 ships, 6 aircrafts, 4 helicopters and 1,100 people ready for performing the task. More than a half of them belong to the Ministry of Defence. Unlike the previous surveillance that only included the control over the internal waters and territorial sea, now the PEFZ shall be controlled as well. The new thing is that five fast ships belonging to port authorities shall take part in the surveillance. The Coordination for the Surveillance of the Adriatic Sea shall control the Croatian part of the Adriatic Sea until the establishment of the future coast guard of the Republic of Croatia. For the purpose of the surveillance of the Adriatic Sea, special radars "Peregrin" have been set on the Island of Lastovo in the altitude of 417 m (range of vision 83 km), on the Island of Vis in the altitude of 587 m (range of vision 100 km) and the island of Dugi otok in the altitude of 166 m (range of vision 53 km). The fourth radar shall be installed on vehicles as some kind of backup. The governmental Coordination for the Surveillance of the Adriatic Sea started to work in October 2004. In order to harmonize the work of the Coordination, it is necessary to change 15 Croatian laws and 50 sublegal acts, which is a very serious and comprehensive task.



Conclusion

Croatia is an independent state and should not be indulgent to direct pressures from abroad - from neighbouring states and the EU - which deny the Croatian sovereignty and independence in this matter. The Republic of Croatia has the right to proclaim an EEZ like every other coastal state in the world in accordance with International Law confirmed by the 1982 UNCLOS. There is no state in the world, except Italy and Slovenia in our case, that has stood against the proclamation of an EEZ. Further delimitation has sometimes been controversial but no one has been denied the right to proclaim an EEZ: Neither the European Union nor the Stabilization and Association Agreement deny the proclamation of an EEZ. The sovereign right of every state is to proclaim an EEZ in accordance with the contemporary Law of the Sea, which more than 120 coastal states have done so far.¹⁹ Politics should have no advantage over such clear provisions of the Law of the Sea. The Mediterranean states are reserved when it comes to proclaiming an EEZ due to a large number of non-coastal states and states in an unfavourable geographic position in Europe, and due to various delimitation problems which could arise in the future. It is clear that most of the states tend to keep the high seas regime in the biggest part of the Mediterranean because of navigation and fishing freedom.

In case that all the coastal states in the Mediterranean proclaim their EEZ, there will be a small part of the Mediterranean under the high seas regime. Out of 21 states in the Mediterranean the following states have proclaimed their EEZ²⁰: Egypt²¹, Spain²² and France²³ in the Atlantic Ocean, Morocco²⁴, Syria²⁵, Turkey²⁶ and Cyprus²⁷. Fishing zones have been proclaimed by Algeria²⁸, Libya²⁹, Malta³⁰, Spain in the Mediterranean Sea³¹ and Tunisia³². France has, despite the lack of definition in the Mediterranean, proclaimed the Zone of ecological protection (Zone de protection écologique), in which particular regulations related to environmental protection are applied³³.

¹⁹ Ibidem.

²⁰ Actually, there are 22 Mediterranean states, if Gibraltar is included as a Non-Self-Governing Territory of the United Kingdom.

²¹ Declaration on 26 August 1983.

²² Law No. 15/1978 of 20 February 1978 (not applicable in the Mediterranean).

²³ Law No. 76-655 of 16 July 1976 (not applicable in the Mediterranean).

²⁴ Law No. 1-81 of 8 April 1981.

²⁵ Internal Waters and Territorial Sea Limits in the Syrian Arab Republic, Law No. 28 of 19 November 2003

²⁶ Decree No. 86/11264 of 17 December 1986 (not applicable in the Mediterranean).

²⁷ Exclusive Economic Zone Law 2 April 2004.

²⁸ Legislative Decree No. 94-13 of 28 May 1994.

²⁹ Declaration of a Libyan fisheries protection zone in the Mediterranean Sea, 24 February 2005.

³⁰ Act No. XXXII of 10 December 1971 as modified by Act No. XXIV of 21 July 1978.

³¹ Royal Decree No. 1315/1997 of 1 August as modified by Royal Decree No. 431/2000 of 31 March 2000.

³² Decree of 26 July 1951 as modified by Law No. 63-49 of 30 December 1963.

³³ Decree No 2004-33 of 8 January 2004. See Claudiane Chevalier, Governance in the Mediterranean Sea Legal Regime and Prospectives, IUCN Centre for Mediterranean Cooperation, Malaga, Spain, 2004, str. 11.



What are the disadvantages of proclaiming a PEFZ? It seems that neighbouring states and the EU are more willing to accept a PEFZ than an EEZ. Nevertheless, it is much legally safer to proclaim an EEZ because it is determined by the institute of the Law of the Sea, that to pass provisions on a zone that has elements of an EEZ but it is not a part of the international treaty and customary practice of the states. Fishing zones are a part of the Customary Law, but they are not legally protected as an EEZ which is also regulated by the treaty law. Besides, a great majority of states has left the practice of proclaiming fishing zones and they opt for a legally safer version – an EEZ. According to the UN data, there are only 14 states in the world with a proclaimed fishing zone³⁴.

The Law of the Sea does not give the right to a coastal state which has proclaimed a fishing zone, to stop a ship when, for example, there is a danger of pollution. By proclaiming an EEZ the coastal states in the Adriatic Sea would, among all, control sustainable fishing, efficiently protect living resources and marine environment. Furthermore, it would be easier to harmonize measures of all the coastal states for preventing illegal, unregulated and unreported fishing. Consequently, the foundation and mechanisms for efficient bilateral and multilateral cooperation of the Mediterranean states regarding the protection of the sea and marine environment would be created. Pouring out lots of oil from one of numerous tanks that would come to the Adriatic Sea, which was the famous case of the tank 'Prestige' in the year 2002 near the coast of Spain, could cause a huge catastrophe for this region. The ecology of the

Adriatic Sea would be heavily disturbed, and Croatia would face a great economic tragedy since fishing and tourism, our vital economic branches, would be destroyed for a long period of time. Croatia should prove itself as a contemporary, marine-oriented country which will, through its regulations, show the will and readiness to preserve and improve marine environment, especially by accepting the contemporary possibilities of development and optimal utilization of natural resources, and all that in cooperation with other states, international and regional organizations.

³⁴ These are Algeria, Belgium, Denmark, Finland, Gambia, Ireland, Libya, Malta, Norway, Palau, Papua New Guinea, Spain, Tunisia and the UK. See Table of claims to maritime jurisdiction as at 30 June 2006, Division for Ocean Affairs and the Law of the Sea Office of Legal Affairs of the United Nations, United Nations, official site World Wide Web URL http://www.un.org/Depts/los/LEGISLATIONANDTREATIES/PDFFILES/claims_2005.pdf The reasons for keeping the status quo regarding the proclamation of an EEZ, and not an obsolete Fishing Zone, are often connected with the inertia of legislation. However, the lack of replacing the Fishing Zone with the EEZ can reflect the fact that with the proclamation of an EEZ the states signatories of the 1982 UNCLOS also get obligations, not only rights. Preserving fishing zones those obligations from the 1982 UNCLOS on an EEZ can be avoided.



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ECO-FRIENDLY PRAWN CULTURE WITH POKKALLI PADDY – TRADITIONAL PRACTICE FOR SUSTAINABLE COASTAL RESOURCE MANAGEMENT

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The market for organic products has expanded rapidly in recent years with organically farmed aquatic products earning premium prices over conventional products. One of the most eco friendly of all farming practices is the Pokkali paddy cultivation – cum- shrimp culture in the Vembanadu lake (Ramsar site), which relies on the symbiotic nature of prawn and paddy. The pokkali paddy, to some extent, is saline, flood and acid resistant is the wonder crop cultivated in vast areas of marshy waterlogged coastal region. The pokkali cultivation is less expensive due to low incidence of diseases in high saline environment. But farmers seem to be disinterested in cultivating pokkali as the market is not good for pokkali due to the unawareness of people that it is eco friendly and organically grown. It is high time for socially and health conscious people to propagate the use of organic paddy and to encourage this farming practice to other wetland regions. This farming, a community-based coastal resource management, which is indeed healthier and sensible money wise, need to be encouraged to protect the coastal wetlands. This alternative income-generating program contributes towards the improvement of coastal environment and to conserve the biodiversity of the ecosystem. This cultivation practice is vulnerable to climate change, climate variability and sea level rise and will be among the first to suffer the impacts of climate change and forced to adapt or abandon. These systems are less well placed to accommodate any unprecedented changes in climate and related environmental conditions that are anticipated to occur during the remainder of the current century. Failure to adapt to climate change now could lead to high social and economic costs in the future.

Introduction

Man made impacts in the coastal ocean and in estuaries has increased rapidly over the last decades affecting the natural dynamic equilibrium and the biotic composition of the respective ecosystems. The main causes for such changes are introduction of untreated and partially treated sewage rich in organic substances and plant nutrients from human settlements, urban areas and certain industries, leaching of nutrients from soils and agricultural fields and animal husbandry.

The west coast of India is environmentally more sensitive than the east coast primarily because it is bordering one of the most sensitive ecosystems in the world, the Arabian Sea. The environmental property of the northern Arabian Sea is unique which manifests in rich biological production throughout the year through different processes and thus, explain for the Arabian Sea ‘ Paradox’ (Mathupratap et al., 1996). The symptoms are there to show considerable impact of deterioration of estuarine waters on the coastal ecosystem (Nair et al., 1991; Naqvi et al., 2000; Jayakumar et al., 2001).



The emerging industrial establishments and human settlements along the west coast of India, thus necessitates a critical evaluation of the nature and quantum of inputs to the Arabian sea as well as their regional assimilative capacities. If there is a possible threat to the well being of the living resources of EEZ of India, then the coastal waters of southwest coast of India, and in particular, Cochin region is the prime location prone to trigger it. The booming city of Cochin has population of nearly 1.5 million (Anon, 1998) and 60% of the chemical industries of Kerala are situated in this area Cochin backwaters are the largest of its kind on the west coast of India with an area of 256 Km². The 16 major and several minor industries situated in the upstream region of the backwaters discharge nearly 0.105 Mm³d⁻¹ of effluents (Anon, 1996). The industrial typology includes fertilizer, pesticide, radio active mineral processing, chemical and allied industries, petroleum refining and heavy metal processing and fish processing. The fertilizer consumption in Kuttanad region (the main agricultural field draining to Cochin backwater) alone is reported to be 20,239 t y⁻¹ (Anon, 1998). The backwater receives organic wastes (~ 260t d⁻¹, Anon, 1998) and an annual dredge spoil from the harbor area to the tune of 10⁷ m³.

Results and discussion

The objective of this study is to evaluate the ecological benefits of the pokkali paddy cum shrimp cultivation on ecology of wetlands and of the potential economic advantages to the local farmers from the practice. It is in our scheme of things that only after we lose something, we sing praises to it and make great lamentations about how good it was.... Pokkali cultivation is no different. Even as scientists sing paens to this cultivation and newer varieties of Pokkali paddy like Vytilla1, Vytilla2, 3,4 and Vytilla 5 were developed at Rice Research station, Vytilla, India to give better yields, the Pokkali paddy fields seem to be shrinking rapidly.

Of the 26,400 hectares of potential Pokkali area in Thrissur, Ernakulam, Alleppy and Kannur districts only 8000 to 10000 hectares are actually used for Pokkali cultivation. The other areas are left unattended citing high labour wages or these are reclaimed to build houses. Even if pure seed material of the new varieties is provided to the farmers, they don't bother to retain the seed. When compared to the paddy fields of Kuttanad, these farmers have less expenditure because of the low incidence of diseases due to the high salinity, but the farmers seem to be disinterested in cultivating Pokkali. People are of the opinion that there is no market for the Pokkali rice largely because people are unaware that it is eco-friendly and organically grown.

The other paddy varieties require several rounds of pesticides, fungicide, weedcide and fertilizer spraying before the grain gets to the market, while the Pokkali paddy is organically grown. But curiously they seem to be no takers for this organic rice. People have become extremely health conscious, yet do not ask for organic paddy or rice. Or is it that the umpteen voluntary agencies doing everything from holding cultural evening to donating tricycles are not bothered about the food that people eat? It is high time socially and health conscious people propagated the use organic food.



One of the most eco-friendly of all farming practices in the world is the Pokkali paddy cultivation – cum prawn farming which is practiced in the wetlands of Alleppy, Trissur, Ernakulam and Kannur districts. This singular method, which has been passed down from generation to generation relies on the symbiotic nature of prawn and paddy. After the harvest, the decaying stubbles of the paddy serve as food for the prawns and like wise the prawn excreta make the field fertile. What is really interesting here is that absolutely no pesticide or fertilizers are used in the fields, making it vastly different from the other prevalent farming practices.

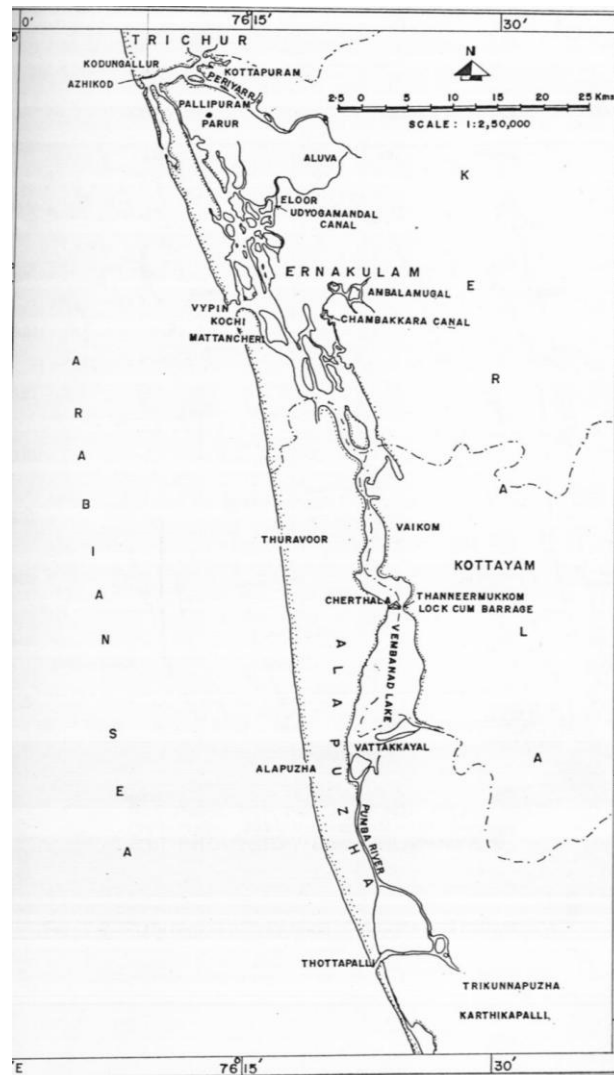


Fig.1. Vembanadu Lake and wetlands of Kerala state, south India.

In the coastal districts of Kerala, vast areas are marshy and water logged. These marshy tracks lie near the mouth of rivers and are prone to flooding and salinity. The nature of the soil is also highly acidic and has elemental toxic content, making the area unsuitable for paddy cultivation. But the Pokkali paddy, which to an extent, is saline, flood and acid resistant, is the wonder crop, which is cultivated in these parts. In the International Plant breeding labs, the gene of the Pokkali paddy is used as the parent gene to culture saline and flood-resistant paddy.



Fig 2. Pokkali rice ready for harvesting

In Pokkali fields only one crop is cultivated during the monsoons (June – October), which is the low saline phase and subsequently during the high saline phase, the fields are used for prawn filtration (November to April). Even Pokkali cannot withstand very high salinity. In the months of April /May the water logged fields are prepared by making mounds and in June, with the onset of monsoons the grains are sown on top of the mounds. This traditional method has been proved by scientists as the best method to prepare the fields because of the larger surface area and it enhances the leaching of the toxic contents of the soil with rainwater. But curiously this method is the least practiced and the farmers resort to the easier method of preparing the fields – bed formation. Though Pokkali paddy is comparatively less labour intensive than other varieties of paddy, the farmers are disinterested in Pokkali and do it just for the sake of feeding the prawns, which is by far more lucrative. The white prawn *P.indicus* or the Tiger prawn *Penaeus monodon* are cultured in these fields. While the farmer may get 1.2-to 1.5 tones/ hectare of Pokkali he will harvest about 400 to 500 kilos/ha of prawns during one season. The Pokkali will fetch about Rs. 12 to Rs. 13 in the market while a kilo of prawns, anywhere between Rs. 450 to 800, depending on the size and variety.



Fig 3. A Pokkali rice field in Ernakulam, Kerala India.

In October when the paddy is mature, only the panicles are cut off, leaving the stubbles in the field to decay and this forms the natural feed for the prawns. Adjacent to the paddy fields lie the prawn fields where the waters from the backwaters are regulated through the sluice gates. From November onwards, prawn seedlings gravitate towards the fields in search of food. The farmers take advantage of the situation and at night, place lamps near the sluice gate to attract the prawn. During the high tide the prawn seedlings are swept into the fields and they remain there. The farmers then place nets at the mouth of the sluice gate to prevent the seedlings from leaving the fields during low tide. During the high tide the net is removed to let more prawn seedlings. The prawn seedlings gorge on the decaying stubbles. The prawns are periodically harvested 2 –3 days before the new and full moons till the middle of April.

It seems beneficial for the juvenile prawns to feed on the decaying stubbles as this keeps the incidences of disease low. Without Pokkali, the entire area will be flooded, acidity will be more, and toxicity will be high and there will be less oxygen and more hydrogen sulphide, which can kill the prawn larvae. All this is effectively removed by the farming operation, which ensures good drainage. It is also cost effective because artificial feed is expensive and prawns are more prone to diseases. Whereas in the pokily fields, the natural feed need to be supplemented with artificial feed only in the last phase just before the prawns are harvested. The prawns require high protein feed, which costs approximately Rs. 25 /Kilo and the requirement is 2 kilo for one kilo of prawn. The constant movement of prawn larvae aerates the field and keep it clear of weeds and the prawn excreta is a good natural fertilizer. The high investment towards feed cost rendered prawn farming always a loss – making venture.



Fig.4 Pokkali rice harvesting practice followed in Ernakulam

In the case of the rice bowl of Kerala (Kuttanadu), with 54,000 hectares of polders had been traditionally yielding two annual rice crops – the Virippu or the monsoon crop and the Punja or the summer crop, the total extent of paddy field lying idle increased alarmingly during the past decade as farmers abandoned rice cultivation due to diminishing and ever- increasing cost of production. An ecologically sustainable and economically viable farming practice for the giant freshwater prawn (*Macrobrachium rosenbergii*) developed on the basis of data base generated from 122 prawn farms in Kuttanadu (Kurup et. al, 2003) representing both mono and poly culture with and without integration of rice had also revealed that it was necessary to carry out paddy cultivation as a follow up of prawn farming.

Pokkali cultivation and wetland water quality.

A comparison of the environmental parameters collected presently with the earlier data can indicate the estuarine system behavior over the years. The available data from the bar mouth region are used as several workers had sampled this region since 1965 and this is the point where the pollutants are brought down to the minimum by dilution before being exported to the coastal waters. The phosphate and nitrates were present in very low levels up to mid 70s' from where, due to the combined effect of increased industrial and agricultural activities, the levels increased during 80s' and 90s'.

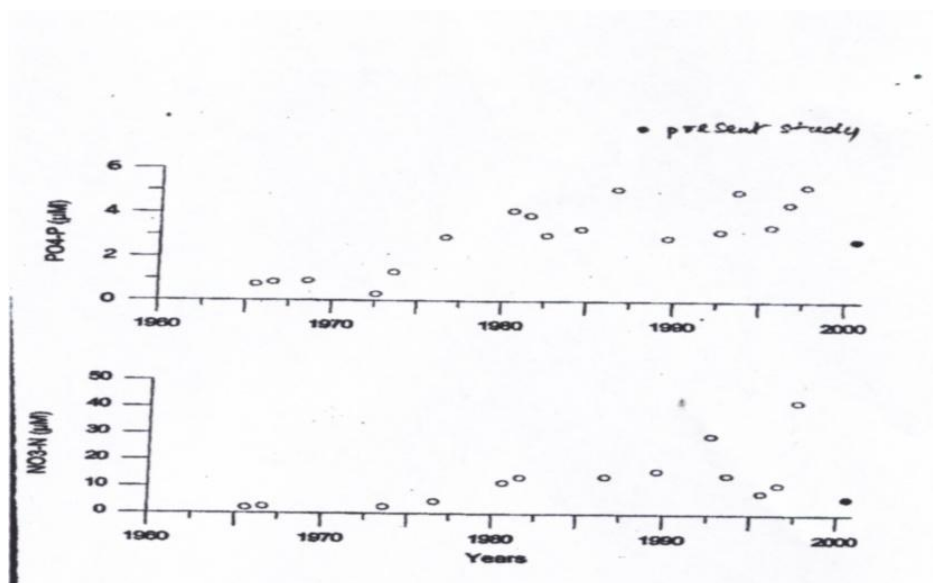


Fig 5. Long term trends in nutrient levels at Cochin bar mouth.

During 1965, the surface phosphate and nitrate were 0.75 and 2.0 μM , which has increased to 2.9 and 6 μM respectively by 2000 even though, between the years it show still higher levels. The trend also shows a build up of nitrogen and phosphorus fractions after 1975 and from 1980 onwards, the concentrations remained high. Enrichment of phosphorus with respect to nitrogen is more leading to mesotrophic waters. However, this enhanced nutrient levels have not lead to any oxygen depletion in the environment, possibly because the river discharge and tidal exchange may be sufficient enough to renew the estuarine waters and prevent deoxygenating even during the lean discharge period. But the maximum nutrient levels reported for the upstream regions were quite alarming. The build up for inorganic phosphate had started after 1973, and the subsequent increase in waste discharge had ultimately resulted in extreme levels of ammonia, phosphate and nitrate in the estuarine region. During 1980-81, the study region had nitrate and phosphate levels up to 40 and 12 μM with its upstream peaks of 108 μM and 186 μM (Saraladevi, 1986). Sankaranarayan et al., (1986) have reported phosphate levels up to 88 μM during 1982-83, in the northern upstream stations. The present study recorded phosphate levels from 5 to 40 μM for the same region. During 1990, the nutrient maximum reported from this estuarine region was 98.48 for nitrate and 15.11 μM for phosphate (Kunjikrishna Pillai, 1991). Sheeba (2000) also had reported nutrient enrichment in this system and recorded nitrate up to 451 μM and phosphate up to 33 μM at the bar mouth alone. The deterioration of environmental quality of Cochin backwaters seems to depend on several factors, all related to human interventions. One of the recent estimate shows that in spite of receiving $42.4 \times 10^3 \text{ mol.d}^{-1}$ of inorganic phosphate and $37.6 \times 10^3 \text{ mol.d}^{-1}$ of inorganic nitrate from Periyar side of the estuary, the export to the coastal waters is only $28.2 \times 10^3 \text{ mol.d}^{-1}$ of inorganic phosphate and $24 \times 10^3 \text{ mol.d}^{-1}$ of inorganic nitrate (Hema Naik, 2000). Thus, the estuary acts as a sink for the nutrients, flushing out only a portion of the pollution load that it receives. The enhancement with respect to these nutrients in Cochin Backwaters shows the signs of eutrophication.



Conclusion

The studies revealed that the best combination of eco-friendly sustainable aquaculture for the wetlands of south India would be a rotational system between rice and prawn. Instead of filling up land and creating monstrosities in concrete, won't some agency encourage this kind of farming which is indeed healthier and sensible money wise? The symbiotic relationship of pokkali paddy with shrimp farming contributes towards a deduction in nutrient loading of the wetlands. On the adaptation of this practice to the entire Kuttanadu paddy fields considerable improvement on the overall water quality of the wetland can be expected.

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SHORT TIME SERIES OF PHYTOPLANKTON, NUTRIENT AND CHLOROPHYLL-A IN WINTER PERIOD IN THE DARDANELLES (ÇANAKKALE STRAIT, TURKEY)

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This study was carried out to determine the short time series of phytoplankton density and chlorophyll-a in relation to nutrients and other environmental parameters in surface waters of the Dardanelles in period of 02 December 2004 and 07 March 2005. Environmental parameters, nutrient and chlorophyll-a were measured by using a YSI 556 MPS, Technicon Model Two Channel Autoanalyzer and Jasco V-530 UV/VIS spectrophotometer, respectively. Average temperature, salinity, pH, specific conductivity, TDS, DO, TSS, $\text{NO}_2^- + \text{NO}_3^-$, PO_4^{3-} , SiO_4 and chlorophyll-a were found to be 9.47 °C, 27.5 ppt, 8.12, 42.86 mS/cm, 27.86 g L⁻¹, 9.23 mg L⁻¹, 27.1 mg L⁻¹, 0.43 µM, 0.23 µM, 2.91 µM, 1.97 µg L⁻¹, respectively. Average N:P ratio was calculated as 1.78 while S:P ratio was 14.9. Total phytoplankton cell density varied between 8.25x10⁴ and 4.71x10⁶ cell L⁻¹. Rational contribution of Bacillariophyceae (%48.8) to total phytoplankton cell density was lower than total contributions of Dinophyceae (%30.9) and other taxonomic groups (%20.3) during the winter period. While the biggest contributions to Dinophyceae cell density were from *Prorocentrum* spp., the biggest contributions to Bacillariophyceae density were from *Pseudonitzschia pungens*, *Rhizosolenia fragilissima*, *Chaetoceros* spp., *Thalassionema nitzschioides*. Except Dinophyceae and Bacillariophyceae, the biggest contributions to other taxonomic groups were from coccolitophorid *Emiliania huxleyi*, *Silicoflagellat Dictyocha* spp. and coccoid Cyanophyceae forms. Short time series distribution of phytoplankton in winter period in the Dardanelles showed that there were 7-9 population growth slope of phytoplankton between 01 December 2004 and 07 March 2005. Therefore, it can be assumed that life cycles of phytoplankton species are completed in period of 1-2 week in winter period in the Dardanelles.

Keywords: *Dardanelles, winter phytoplankton, nutrients, chlorophyll-a, environmental parameters*

Introduction

The Turkish Straits System including the Bosphorus, the Sea of Marmara and the Dardanelles (Çanakkale Strait) connects the Mediterranean and the Black Sea (Besiktepe *et al.* 1994; Polat and Tugrul 1996). The Sea of Marmara is a semi-enclosed basin with an 11500 km² area and a 3378 km³ total volume (Polat and Tugrul 1996). The Dardanelles (Çanakkale Strait) which is a part of the Turkish Strait System is located between the Aegean Sea and the Sea of Marmara and has a 50 m mean depth (Polat and Tugrul 1996).

The Dardanelles is a very important water passage connecting the Aegean Sea and the Marmara Sea. The Dardanelles has two current systems. One of the currents is derived from the Aegean Sea, where the water density is high. The other comes from the Sea of Marmara that characteristically is of low density. Aegean water is typically flowing from the southwest to northeast below the Marmara Sea water (Polat and Tugrul 1996; Unsal *et al.* 2003; Turkoglu *et al.* 2004a, 2006; Baba *et al.* 2005).



Due to large salinity differences between the Aegean (38-39‰) and the Sea of the Marmara (24-26‰), it is likely to observe intense vertical mixing of the counter-flows in the Dardanelles, especially near the southern exits. This way, before reaching to the Aegean basin, the salinity of the Dardanelles surface flow increases at least 4-8‰. The Dardanelles surface water was more saline in the spring and winter compared to other seasons in the south east of the Dardanelles. When the salinity in the surface water was low, values of total dissolved solids in the Dardanelles are lower (Unsal *et al.* 2003; Turkoglu *et al.* 2004a, 2006) than those in other marine systems ($\geq 35.0 \text{ mg L}^{-1}$) (Xie *et al.* 2003). According to previous studies in the Dardanelles, temporal cycle of pH showed fluctuations throughout the year, winter values were significantly lower (mean 8.20) than the spring (mean 8.36) and fall values (mean 8.28). DO concentrations varied from 6.75 to 10.1 mg L^{-1} during the year, being higher in the spring and winter compared to summer (Turkoglu *et al.* 2004b).

Phytoplankton succession in the region shows similarities to the Black Sea (Turkoglu and Koray, 2000, 2002). It is controlled by blooms of coccolithophorid *Emiliania huxleyi*, dinoflagellate species such as *Ceratium spp.* ve *Prorocentrum spp.*, *Pseudonitzschia pungens* and diatoms such as *Proboscia alata f. gracillima*, *Rhizosolenia fragilissima* (Unsal *et al.*, 2003; Turkoglu *et al.*, 2004a, 2004b, 2004c). The species mentioned above and some others that are opportunistic suppress other phytoplankton species due to fluctuations in the nutrients. Researchers have been reported previous harmful and toxic algal blooms, especially *Dinophysis spp.* and *Gonyaulax spp.* is being a potential threat in the region (Unsal *et al.*, 2003; Turkoglu *et al.*, 2004a, 2004b; 2004c).

In this study, we tried to explore nutrient, chlorophyll-a, phytoplankton interactions with respect to environmental parameters in the Dardanelles (Çanakkale Strait) during the winter period (02 December 2004-07 March 2005). We also tried to demonstrate short time variations in phytoplankton, chlorophyll-a, nutrients and the other environmental parameters in the ecosystem.

Materials and Methods

For this study, environmental parameters, phytoplankton, nutrient and chlorophyll-a data were analyzed from one station (D) located at $40^{\circ} 07' 05''$ N latitude and $26^{\circ} 24' 00''$ E longitude (Fig. 1). The sampling period and frequency were planned in 5 day intervals in winter period of 02 December 2004 and 07 March 2005.

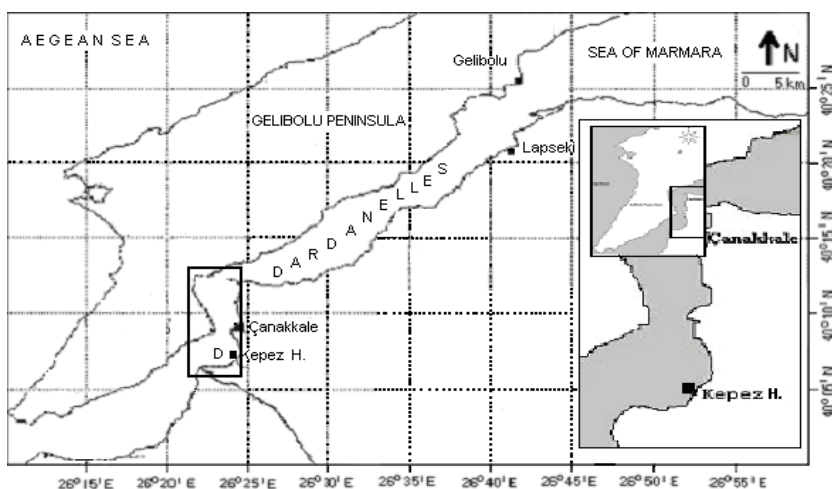


Fig.1. Dardanelles and sampling station (D)



Temperature (T), salinity (S), pH, dissolved oxygen (DO) and total dissolved solids (TDS) were measured in surface water (0.5 m). Environmental parameters were measured using an “YSI 556 Model Multiple Water Analysis Probe” *in situ*. Nutrient, TSS, chlorophyll-a and phytoplankton samples were collected from the surface with a 5 L Water Sampler.

Water samples collected for TSS determination were filtered through a pre-weighed GF/F glass fiber filters after the filters were dried for 4 h at 105°C in an oven. The residues retained on the GF/F glass fiber filters were dried again for 1 h at 105°C in an oven. Then, the samples were cooled in a desiccator to balance temperature and weighed by a sensitive balance (APHA, 1998). TSS was accepted as an increase in weight of the filter and calculated using by following formula,

$$\text{TSS (mg L}^{-1}\text{)} = \frac{(A-B) \times 1000}{\text{Sample volume, ml}}$$

(Where: A=weight of filter + dried residue, mg; B=weight of filter, mg)

Nutrient samples collected from the surface were transferred to 100 ml polyethylene bottles and kept frozen until analysis. Nutrient analyses including nitrate (NO_3^-), nitrite (NO_2^-), soluble reactive phosphorus (PO_4^{3-}) and silicate (SiO_4) were conducted using a Technicon model two-channel Auto-Analyzer according to Strickland and Parsons (1972).

Samples for chlorophyll-a determination were collected immediately after the water samples were collected. The samples were filtered through GF/F glass fiber filters. Chlorophyll-a concentration was analyzed spectrophotometrically after extraction by 90 % acetone (Strickland and Parsons 1972). Filters that were used for filtration of surface water were wrapped in aluminum foil and kept frozen until analysis.

Whole water phytoplankton samples collected from the surface were preserved with acidic Lugol % 2-4 v/v and kept at 2-4 °C pending microscopic analysis. For enumeration of the phytoplankton species, Utermöhl Sedimentation Chambers, Neubauer and Sedgwick-Rafter counting slides were used in combination according to the dimensions of the organisms (Guillard 1978; Hassle 1978; Venrick 1978). The phytoplankton was identified under phase-contrast microscopy to the taxonomic level of species (Tregouboff and Rose 1957; Cupp 1977). Depending on the density, sample volumes of 2-8 ml were used.

Descriptive statistics and correlations of data groups were conducted using BioDiversity Pro/BD2.bdp (McAleece et al., 1999) and SPSS 11.5 for windows (SPSS, 2003).



Results

Environmental Parameters and Total Suspended Solids (TSS)

Descriptive statistics and temporal distribution of the short time series for environmental parameters and total suspended solids (TSS) in the surface water of the Dardanelles in the winter period of 02 December 2004 and 07 March 2005 are displayed in Table 1 and Fig. 2 and 3.

Table 1. Descriptive statistics of some physicochemical parameters in surface waters of Kepez harbor in the Dardanelles in the winter period of 02 December 2004 and 07 March 2005

Dec. 05-Mar. 05	N	Min	Max	Mean	SD
Temperature (°C)	21	7.010	13.72	9.466	1.901
salinity (ppt)	21	26.43	29.22	27.51	0.596
pH	21	7.360	8.770	8.124	0.397
TDS (g L ⁻¹)	21	27.20	29.37	27.86	0.496
DO (mg L ⁻¹)	21	6.640	12.35	9.229	1.225
PO ₄ ³⁻ (μM)	21	0.070	0.570	0.233	0.129
NO ₂ ⁻ +NO ₃ ⁻ (μM)	21	0.100	1.970	0.427	0.420
SiO ₄ (μM)	21	0.860	11.24	2.905	2.576
Chlorophyll-a (μg L ⁻¹)	21	0.829	3.794	2.180	0.777
TSS (mg L ⁻¹)	21	9.400	140.1	27.13	36.61
N:P Ratios	21	0.620	3.590	1.780	1.000
S:P Ratios	21	4.110	53.94	14.92	12.83

Temperature and salinity varied between 7.01 and 13.72 °C (mean 9.47 °C) and 26.43 and 29.22 ppt (mean 27.5 ppt), respectively. Due to vertical mixing between two-layer flows in the Dardanelles, salinity was variable like in the temperature profile at the time of sampling (Fig. 2). Additionally, December and February-March salinity values were higher than the January values (Table 1 and Fig. 2). Although, temporal cycle of pH showed some fluctuations throughout the year (7.36-8.77) like in the salinity profile. Similarity between salinity and pH was supported with the correlation coefficient result ($r=0.618$) (Table 1).

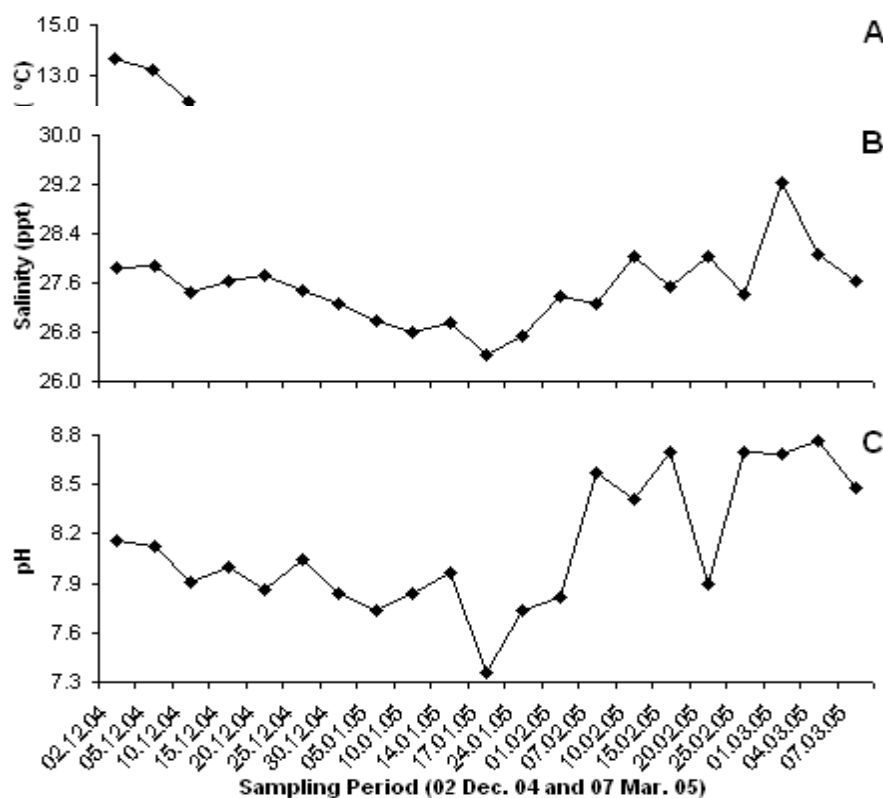


Fig. 2. Short time series of temperature (A), salinity (B) and pH (C) in surface waters of Kepez harbor in the Dardanelles in the winter period of 02 December 2004 and 07 March 2005

DO concentrations varied from 6.64 to 12.35 mg L⁻¹ during the year (Table1), being lower on 25 December and 24 January compared to other sampling dates (Fig. 3). However, DO was super saturated on 02 December 2004 (Fig. 3). TDS profiles were similar to the salinity profiles (Fig. 2) and similarity was supported by the correlation coefficient between TDS and salinity ($r=0.989$). The December and January TDS values were lower than the February and March values like in the salinity profile (Table 1 and Fig. 3).

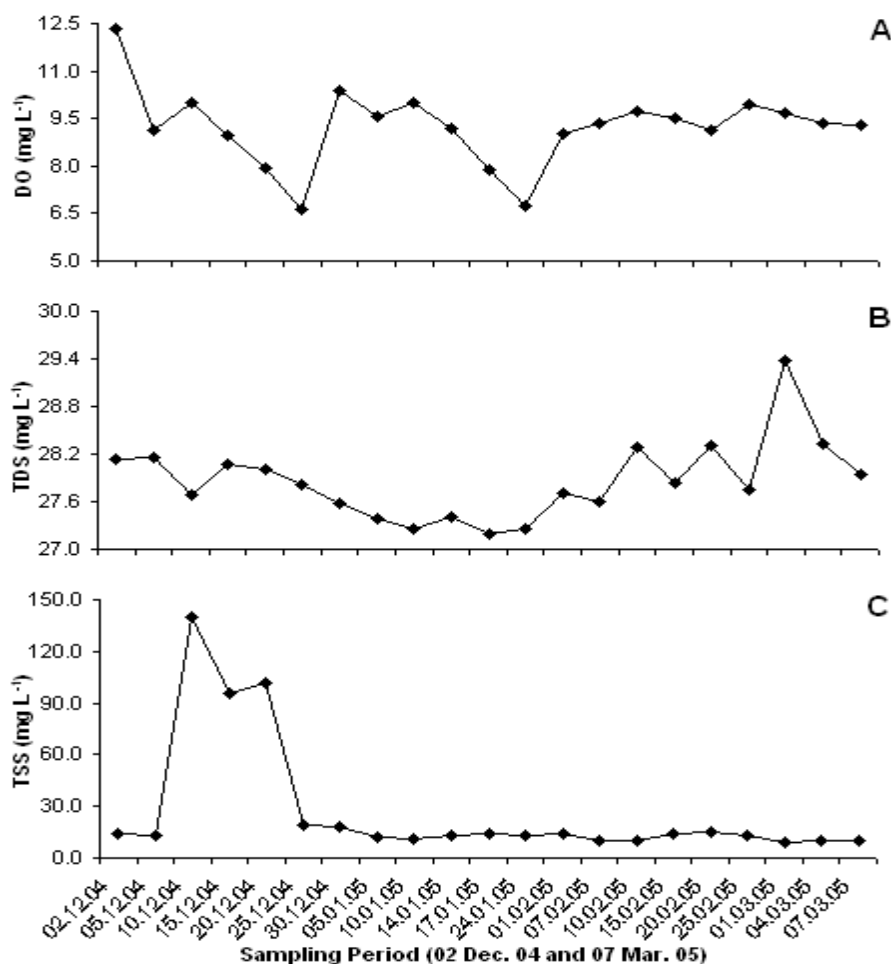


Fig. 3. Short time series of dissolved oxygen (DO) (A), total dissolved solids (TDS) (B) and total suspended solids (TSS) (C) in surface waters of Kepez harbor in the Dardanelles in the winter period of 02 December 2004 and 07 March 2005

TSS values varied between 9.40 and 140.1 mg L⁻¹ (27.13 mg L⁻¹) during the winter period (Table 1). Due to high terrestrial inputs by Kepez stream, TDS values were higher (95.7-140.1 mg L⁻¹) than other sampling dates (9.40-18.7 mg L⁻¹) between 10-20 December 2004 (Fig. 3).

Temporal Distribution of Nutrients

Results of descriptive statistics of N:P and S:P ratios and distribution of nutrients (PO_4^{3-} , $\text{NO}_2^- + \text{NO}_3^-$ and SiO_4) and chlorophyll-a in short time intervals in the Dardanelles in winter period of 02 December 2004 and 07 March 2005 are shown in Table 1 and Fig. 4, respectively.

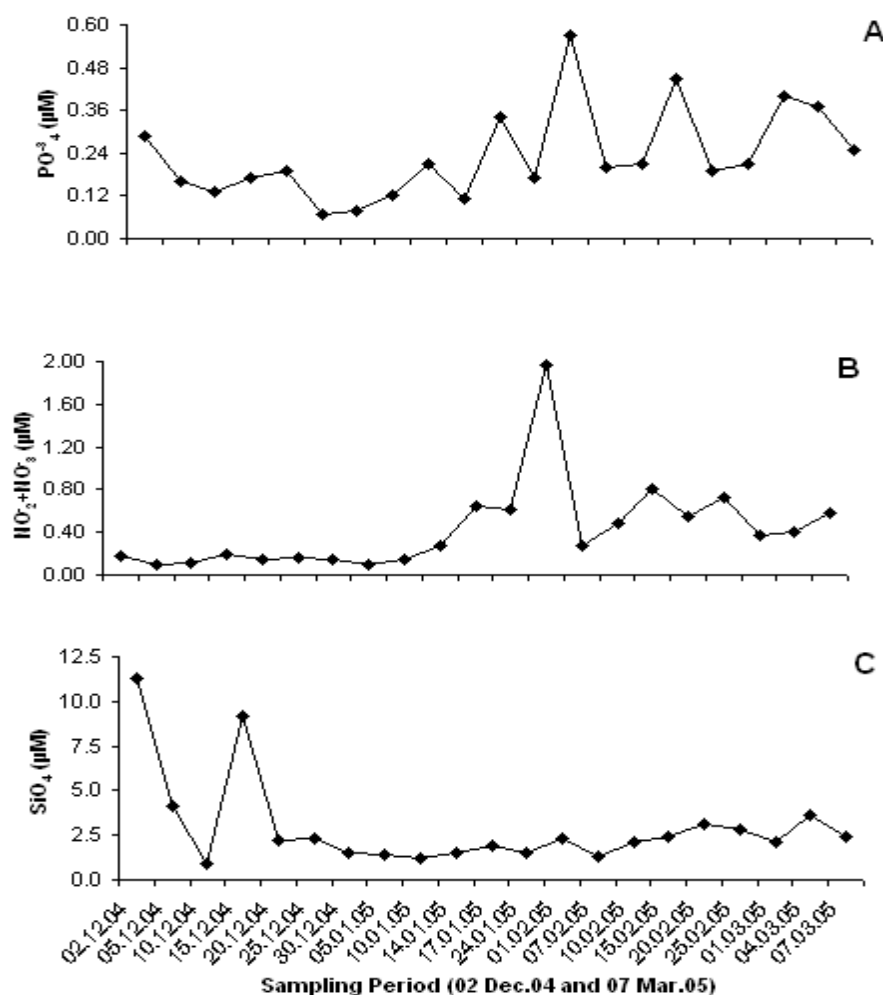


Fig. 4. Temporal distribution of $\text{NO}_2 + \text{NO}_3$ (A), PO_4^{3-} (B) and SiO_4 (C) in short time intervals (05 day) in surface waters of Kepez harbor in the Dardanelles in the winter period of 02 December 2004 and 07 March 2005

Due to winter phytoplankton blooms, both N:P and S:P ratios were significantly lower than both the assimilatory optimal Redfield ratio and previous N:P and S:P values in the Dardanelles (Turkoglu et al., 2004a). Naturally, the study system is nitrogen limited and low N:P ratios in this study confirmed previously reported values of Polat et al., 1998 and Turkoglu et al., 2004a.

PO_4^{3-} , $\text{NO}_2 + \text{NO}_3$ and SiO_4 were varied between 0.07-0.57 μM, 0.10-1.97 μM and 0.86-11.24 μM, respectively, in the surface waters of the Dardanelles (Table 1). PO_4^{3-} showed more fluctuations than those in $\text{NO}_2 + \text{NO}_3$ and SiO_4 during the sampling period (Fig 4). Additionally, the time of peak in PO_4^{3-} was similar to $\text{NO}_2 + \text{NO}_3$. Contrary to $\text{NO}_2 + \text{NO}_3$ and PO_4^{3-} , SiO_4 showed a regular distribution, except in the period of 02-20 December 2004.



Nevertheless, SiO_4 concentrations showed high variations in like other nutrients due to high fluctuations in the period of 02-20 December 2004 (Fig. 4-C).

Temporal distribution of winter phytoplankton and Chlorophyll-a

Descriptive statistics in cell density of different taxonomic groups of phytoplankton and percent contribution (%) to total phytoplankton are shown in Table 2 and 3, respectively. Temporal distributions in density of different phytoplankton groups in surface waters of Kepez harbor in the Dardanelles in the winter period of were also shown in Fig. 5.

Taxonomic Groups	Phytoplankton Cell Density (Cells L ⁻¹)				
	N	Min	Max	Mean	SD
Cyanophyceae	21	0.00E+0 0	6.88E+0 5	8.93E+0 4	1.95E+0 5
Dinophyceae	21	4.71E+0 4	7.54E+0 5	3.62E+0 5	2.33E+0 5
Prynesiophyceae	21	0.00E+0 0	2.36E+0 6	2.38E+0 5	6.25E+0 5
Dictyochophyceae	21	0.00E+0 0	2.36E+0 5	8.89E+0 4	8.47E+0 4
Bacillariophyceae	21	0.00E+0 0	3.06E+0 6	8.92E+0 5	9.45E+0 5
Euglenophyceae	21	0.00E+0 0	5.89E+0 4	1.30E+0 4	1.48 E+04
Total Phytoplankton	21	8.25E+0 4	4.71E+0 6	1.68E+0 6	1.24E+0 6

Tablo 2. Results of descriptive statistics in cell density of different phytoplankton taxonomic groups in surface waters of Kepez harbor in the Dardanelles in the winter period of 02 December 2004 and 07 March 2005

Taxonomic Groups	Ratios (%)				
	N	Min	Max	Mean	SD
Cyanophyceae	21	0.00	24.80	3.110	6.710
Dinophyceae	21	6.10	76.19	30.91	20.69
Prynesiophyceae	21	0.00	82.99	9.410	23.15
Dictyochophyceae	21	0.00	24.24	7.130	7.390
Bacillariophyceae	21	0.00	89.02	48.76	26.74
Euglenophyceae	21	0.00	2.400	0.680	0.810

Tablo 3. Descriptive statistics of cell densities of different taxonomic groups in surface waters of Kepez harbor in the Dardanelles in the winter period of 02 December 2004 and 07 March 2005



Although there were dramatic changes due to various algal blooms during the winter period, phytoplankton growth capacity during January ($5.03\text{E}+05$ - $3.26\text{E}+06$ Cells L^{-1}) and February ($5.19\text{E}+05$ - $4.71\text{E}+06$ Cells L^{-1}) was higher than December ($8.25\text{E}+04$ - $2.84\text{E}+06$ Cells L^{-1}) and March periods ($4.09\text{E}+05$ - $1.96\text{E}+06$ Cells L^{-1}) (Fig. 5). Although the largest contribution to total phytoplankton growth was by diatoms (Bacillariophyceae) during January ($3.61\text{E}+05$ - $2.90\text{E}+06$ Cells L^{-1}) and February ($3.14\text{E}+05$ - $3.06\text{E}+06$ Cells L^{-1}), contribution of diatoms decreased in other period ($4.71\text{E}+04$ - $8.49\text{E}+05$ Cells L^{-1}). However, dinoflagellates (Dinophyceae) showed regular fluctuations at 15 day intervals and varied between $4.71\text{E}+04$ and $7.54\text{E}+05$ Cells L^{-1} during the winter period (Fig. 5).

Among the other taxonomic groups, although Prymnesiophyceae (i.e., coccolithophore *Emiliania huxleyi*) showed two peaks in early December (02 Dec.04; $2.36\text{E}+06$ Cells L^{-1}) and late February (20 Feb.05; $1.57\text{E}+06$ Cells L^{-1}), there weren't any coccolithophore production in other periods. Although Cyanophyceae (coccoid cyanobacteria) varied between $0.00\text{E}+00$ and $2.36\text{E}+04$ Cells L^{-1} during December 2004 and January 2005, they showed three peaks in different importance in early February (01 Feb.05; $6.88\text{E}+05$ Cells L^{-1}), late February (20 Feb.05; $3.14\text{E}+05$ Cells L^{-1}) and early March (04 March 05; $4.87\text{E}+05$ Cells L^{-1}), respectively (Fig. 5-B). Except a period of no production in samplings of 15 December 2004 and 16 January 2005, Dictyochophyceae (silicoflagellates) varied between $7.86\text{E}+03$ and $2.36\text{E}+05$ Cells L^{-1} during the winter period. The other taxonomic group, Euglenophyceae varied between $0.00\text{E}+00$ and $5.89\text{E}+04$ Cells L^{-1} (Table 2 and Fig. 5-B).

Contributions of *Dinophyceae*, *Bacillariophyceae* and other taxonomic groups (*Cyanophyceae*, *Prymnesiophyceae*, *Dictyochophyceae* and *Euglenophyceae*) to total phytoplankton varied between %6.10-76.2, %0.0-89.02 and %0.0-85.62, respectively (Table 3).

Chlorophyll-a values varied between 0.829 and 3.794 $\mu\text{g L}^{-1}$ in the surface waters of the Dardanelles during the sampling period. The temporal distribution of chlorophyll-a is shown in Fig. 5-C. High winter chlorophyll-a values ranged from 1.96 - 2.988 $\mu\text{g L}^{-1}$ in December, 1.215 - 3.480 $\mu\text{g L}^{-1}$ in January, 1.593 - 3.794 $\mu\text{g L}^{-1}$ in February, and 1.706 - 2.359 $\mu\text{g L}^{-1}$ in early March (Fig 4-D). Chlorophyll-a was highly correlated with Bacillariophyceae ($r=0.726$) than Dinophyceae ($r=0.579$) and the other taxonomic groups ($r=0.514$) (Fig. 5-C and Table 5).

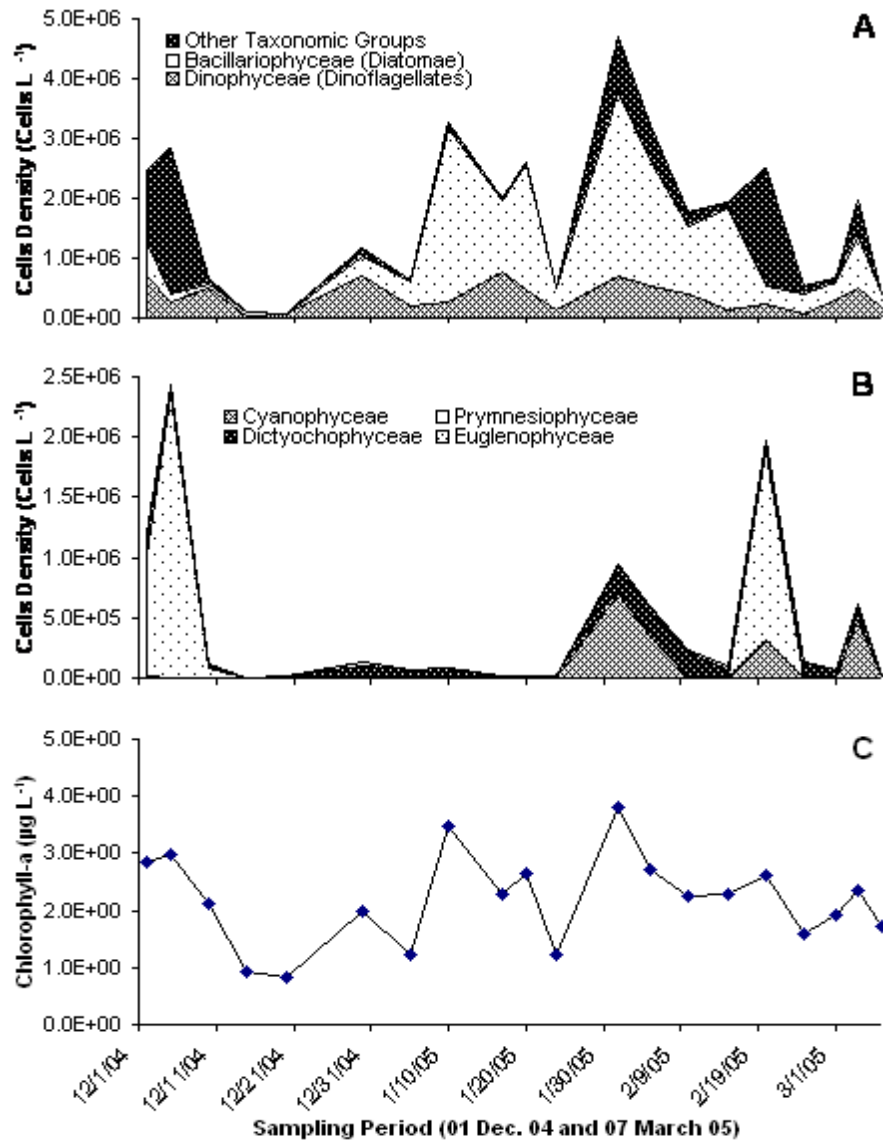


Fig. 5. Temporal distribution of percent contributions of *Bacillariophyceae*, *Dinophyceae* and other taxonomic groups (*Cyanophyceae*, *Prymnesiophyceae*, *Dictyochophyceae* and *Euglenophyceae*) to total phytoplankton (A), *Cyanophyceae*, *Prymnesiophyceae*, *Dictyochophyceae* and *Euglenophyceae* to total other taxonomic groups (B) and chlorophyll-a (C) in surface waters of Kepez harbor in the Dardanelles in the winter period of 02 December 2004 and 07 March 2005



Contributions of some species to total phytoplankton and contribution levels

Table 4 shows the contributions of *Dinophyceae*, *Bacillariophyceae* and other taxonomic groups (*Cyanophyceae*, *Prymnesiophyceae*, *Dictyochophyceae* and *Euglenophyceae*) to total phytoplankton has been varied between %6.10 and %76.2, none to %89.02 and none to %85.62, respectively.

Table 4. Contribution of different taxonomic groups to total phytoplankton and contribution of some important species to the taxonomic groups in surface waters of Kepez harbor in the Dardanelles in the winter period of 02 December 2004 and 07 March 2005

Tarih G/A/Y	Dinop %	Important Species in Dinophyceae and Ratios (%)	Bacil. %	Important Species in Bacillariophyceae and Ratios (%)	Other %	Important Species in Other Taxonomic Groups and Ratios (%)
02.12.0 4	28,80	H.triquedra (%11.5), P.micans (%6.2)	22,40	R.fragilissima (%15.4)	48,80	E.huxleyi (%38.5), Dictyocha spp. (%5.4)
05.12.0 4	9,96	H.triquedra (%5.5), P.micans (%2.7)	4,43	R.fragilissima (%2.2)	85,62	E.huxleyi (%81.9)
10.12.0 4	72,09	H.triquedra (%14.9), P.micans (%38.3)	11,63	Coscinodiscus spp., Navicula spp., R.fragilissima, T.nitzschoides (%11.6)	16,28	E.huxleyi (%10.9), Euglenaphyceae (%2.2)
15.12.0 4	50,00	P.minimum, Protoperidiniu m spp., S.trochoidea (%50.0)	50,00	G.marina, R.fragilissima, T.longissima (%50.0)	0,00	
20.12.0 4	76,19	Prorocentrum spp. (%38.09), P.elegans (%19.05), S.trochoidea (%19.05)	0,00		23,81	D. fibula var. messanensis (%23.81)
25.12.0 5	34,73	P. micans (%23.95)	44,31	C.closterium, L.danicus, Hemiaulus spp., P.pungens (%40.7)	20,96	Dictyocha spp. (%20.96)
30.12.0 4	60,81	Prorocentrum micans (%38.5), P.minimum, P.triestinum (%12.2)	28,38	Pseudonitzschia spp.(%12.2), C.closterium, Coscinodiscus spp., Synedra spp. (%14.2)	10,81	D.fibula var. messanensis (%3.38), D.speculum (%3.38)



Table 4. Cont.

05.01.0 5	33,33	Prorocentrum micans (%15.2), P.scutellum, P.triestinum (%9.1)	57,58	Pseudonitzschia pungens (%45.5)	9,09	Dictyocha spp. (%9.09)
10.01.0 5	8,66	C.fusus var.seta,D.caud ata var.caudata (%1.4), Prorocentrum spp. (%6.5)	88,81	Pseudonitzschia pungens (%54.2), C.closterium (%8.7), Climachosphenia spp. (11.6%)	2,53	Dictyocha spp. (%2.53)
14.01.0 5	37,65	C.furca var.furca (%4.7), P.micans (%20.0), P.triestinum (%7.1)	61,18	Leptocylindrus spp. (10.6%), Licmophora spp. (5.9%), P.pungens (29.4%)	1,18	Euglenaphyceae (%1.18)
17.01.0 5	17,48	Ceratium spp. (%2.3), Prorocentrum spp. (%12.6), Prt.longissima (%2.1)	81,80	Cheatoceros spp. (%35.5), P.pungens (%35.6), Climachosphenia spp.(%6.4)	0,71	D. speculum (%0.71)
24.01.0 5	25,00	Ceratium spp. (%6.3), Prorocentrum spp. (%15.6), Prt.longissima (%3.1)	71,88	Cheatoceros spp. (%37.5), P.pungens (%15.6), Climachosphenia spp.(%6.3)	3,13	D. speculum (%3.13)
01.02.0 5	15,00	C.furca var.furca (%1.3), P.micans (%9.2), P.triestinum (%7.1)	65,00	T.nitzschoides (%20.8), L.abbreviata (%11.7), T.frauenfeldii (%6.3)	20,00	Cyanobacteria (%14.6), D.polyactis (%5.0), Euglenaphyceae (%0.4)
05.02.0 5	16,99	C.furca var.furca (%2.4), P.micans (%7.2), P.triestinum (%4.4)	64,81	T.nitzschoides (%24.6), L.abbreviata (%10.5), T.frauenfeldii (%7.7)	18,20	D.polyactis (%17.8), Euglenaphyceae (%0.4)
10.02.0 5	22,32	Prorocentrum spp. (%14.3), C.fusus var.seta (%4.5)	64,29	T.nitzschoides (%28.6), Pseudonitzschia spp. (%8.0)	13,39	Dictyocha polyactis (%9.8)



Table 4. Cont.

15.02.0 5	6,10	Prorocentrum spp. (%3.66), Ceratum spp. (1.2), S.trochoidea (%1.2)	89,02	Pseudonitzschia spp. (%37.8), T.nitzschioides (%18.3), Chaetoceros spp. (%8.5), N.longissima (%6.1)	4,88	Dictyocha polyactis (%3.7), Euglenophyceae (%1.2)
20.02.0 5	8,81	Prorocentrum spp. (%5.04), Ceratum spp. (1.3)	12,58	L.minimus (%6.29), Licmophora spp. (%2.52)	78,62	Cyanophyceae (%12.6), E.huxleyi (%62.9)
25.02.0 5	12,12	D.acuminata, P.micans, P.reticulatum, S.trochoidea (%12.12)	63,64	Leptocylindrus spp. (%33.3), Licmophora spp. (15.2%)	24,24	Dictyocha spp. (%24.24)
01.03.0 5	45,24	P.micans (%16.7), S.trochoidea (%4.76)	45,24	Licmophora spp. (19.0%), C.closterium. (%7.14)	9,52	Dictyocha spp. (%9.52)
04.03.0 5	25,60	Prorocentrum spp. (%13.9), Ceratum spp. (%3.1), Protopteridinium spp. (%3.1)	43,20	Leptocylindrus spp. (%17.7), Licmophora spp. (11.5%), Chaetoceros spp. (%3.1)	31,20	Cyanophyceae (%23.9), Dictyochophyceae (%4.6), Euglenaphyceae (%1.5)
07.03.0 5	42,31	Prorocentrum spp. (%30.8), Protopteridinium spp. (%7.7), S.trochoidea (%3.8)	53,85	Licmophora spp. (15.4%), Leptocylindrus spp. (%11.5), C.closterium. (%7.69)	3,85	D.polyactis (%3.85)

Table 4 also shows that the major contributions to total phytoplankton was from dinoflagellate *Heterocapsa triquetra*, *Prorocentrum* spp. (*P.micans*, *P.minimum*, *P.scutellum*, *P.triestinum*], *Ceratum* spp. (*C.furca* var.*furca*, *C. fusus* var. *seta*), *Scipsiella trochoidea*, *Protopteridinium* spp. (*P.longissima*, *P.elegans*), *Dinophysis* spp. (*D.caudata* var.*caudata* ve *D.acuminata*), *Protoceratium reticulatum*, diatom *Cheatoceros* spp., *Climachosphenia* spp., *Coscinodiscus* spp., *Cylindrotheca closterium*, *Grammatophora marina*, *Hemiaulus hauckii*, *Leptocylindrus danicus*, *Licmophora* spp., *Navicula* spp., *Nitzshia longissima*, *Pseudo-nitzschia pungens*, *Rhizosolenia fragilissima*, *Synedra* spp., *Thalassionema nitzschioides*, *Thalassiothrix longissima*, *Thalassiothrix frauenfeldii*, coccolitophore *Emiliana huxleyi*, coccoid cyanobacteria and silicoflagellate *Dictyocha* spp. (*D. polyactis*, *D. fibula* var. *messanensis*, *D. speculum*) in surface waters of Kepez Harbor in the Dardanelles (Table 4).



Pearson Correlation Coefficients of Different Bio-physicochemical Data Groups

Pearson correlation coefficients between different bio-physicochemical data groups in surface waters of Kepez Harbor in the Dardanelles in the winter period of 02 December 2004 and 07 March 2005 are shown in Table 5.

Table 5. Pearson correlation coefficients between different bio-physicochemical data groups in surface waters of Kepez harbor in the Dardanelles in the winter period of 02 December 2004 and 07 March 2005 (N: 21; Sig. 2-tailed)

	Temp.	Salin.	pH	TDS	DO	PO ₄ ³⁻	NO ₂ +NO ₃	SiO ₄	Chl-a	TSS	Dinop	Bacill	Other Groups	Tot. Phyto
Temp														
	1	-.037	.458*	-.037	.230	-.372	-.465*	.476*	.082	.413	.234	-.317	.312	-.028
	.	.872	.037	.872	.317	.097	.034	.029	.724	.633	.307	.161	.169	.905
Salin														
	-.037	1	.618*	-.037	.291	.260	-.064	.279	.305	.026	-.104	-.408	.303	-.165
	.872	.	.037	.872	.201	.255	.782	.221	.179	.913	.653	.066	.182	.476
pH														
	-.458*	.618*	1	-.458*	.317	.288	.025	.092	.040	.239	-.149	-.116	.011	-.111
	.037	.003	.	.037	.162	.205	.916	.692	.864	.918	.519	.616	.961	.633
TDS														
	-.053	.989*	.579*	-.053	.236	.295	-.051	.310	.312	.006	-.130	-.389	.286	-.164
	.818	.000	.037	.818	.304	.194	.826	.171	.168	.981	.574	.082	.210	.477



Table 5 Cont.

DO			.3 1 7	.2 3 6	1	.14 2	-.124	.40 5	.073	- .0 6 3 7 8 6	.317	.014	.187	.173
	.230	.291												
	.317	.201	.1 6 2	.3 0 4	.	.54 0	.591	.06 8	.753		.161	.952	.416	.454
PO⁻³₄			.2 8 8	.2 9 5	.14 2	1	.752* *	.09 8	-.019	- .2 5 2 2 .2 7 1	.078	.523*	.073	.453*
	-.372	.260												
	.097	.255	.2 0 5	.1 9 4	.54 0	.	.000	.67 2	.934		.736	.015	.754	.039
NO₂⁺			.0 2 5	- 0 1	- 12 4	.75 2**	1	- .12 3	-.070	- .2 7 3 .2 3 1	.102	.528*	.069	.459*
	-.465*	-.064												
NO₃			.9 1 6	.8 2 6	.59 1	.00 0	.	.59 7	.763		.660	.014	.767	.036
	.034	.782												
SiO₄			.0 9 2	.3 1 0	.40 5	.09 8	-.123	1	.196	.1 1 0 .6 3 4	.010	-.256	.317	-.020
	.476*	.279												
	.029	.221	.6 9 2	.1 7 1	.06 8	.67 2	.597	.	.394		.967	.262	.161	.932
Chl-a			- .0 3 2 .8 9 1	- 0 6 5 .7 8 0	.31 9	- .44 2*	.387	- .02 5	1	- .4 0 5 .0 6 9	.579**	.726**	.514**	.942**
	.042	-.055												
	.855	.812			.15 9	.04 5	.082	.91 4	.		.463	.151	.017	.837
TSS			- .2 3 9 .2 9 8 8	.0 0 6 .9 8 1	- .06 3	- .25 2	-.273	.11 0	.149	- 1 - .201 - .373 - .218 - .440*				
	.413	.026												
	.063	.913			.78 6	.27 1	.231	.63 4	.519		.382	.096	.343	.046
Dinoph			- .1 4 9 .5 1 9	- .1 3 0 .5 7 4	.31 7	.07 8	.102	.01 0	.169	- .2 0 1 .3 8 2	1	.369	.150	.551**
	.234	-.104												
	.307	.653			.16 1	.73 6	.660	.96 7	.463		.	.099	.517	.010



Table 5 Cont.

Bacill.	-.317	-.408	-.1	-.3	.01	.52	.528*	-.25	-.324	-.3	.369	1	-.060	.798**
			1	8	4	3*		6		7				
			6	9						3				
			.6	.0	.95	.01		.26		.0				
	.161	.066	1	8	2	5	.014	2	.151	9	.099	.	.797	.000
			6	2						6				
Other	.312	.303	.0	.2	.18	.07	.069	.31	.306	-.2	.150	-.060	1	.529*
			1	8	7	3		7		1				
			1	6						8				
Groups	.169	.182	.9	.2	.41	.75	.767	.16	.177	.3	.517	.797	.	.014
			6	1	6	4		1		4				
			1	0						3				
Total	-.028	-.165	-.1	-.1	.17	.45	.459*	-.02	-.048	-.4	.551**	.798**	.529*	1
			1	6	3	3*		0		4				
			1	4						0				
										*				
Phyto	.905	.476	.6	.4	.45	.03	.036	.93	.837	.0	.010	.000	.014	.
			3	7	4	9		2		4				
			3	7						6				

* Correlations are significant at 0.05 level (2-tailed).

** Correlations are significant at 0.01 level (2-tailed).

Considering physicochemical properties there were positive correlations between temperature and SiO_4 ($r=0.476$), salinity and pH ($r=0.618$), salinity and TDS ($r=0.989$), pH and TDS ($r=0.579$), PO_4^{3-} and $\text{NO}_2^- + \text{NO}_3^-$ ($r=0.752$). Positive correlations were also observed between PO_4^{3-} and Bacillariophyceae ($r=0.523$), PO_4^{3-} and total phytoplankton ($r=0.453$), $\text{NO}_2^- + \text{NO}_3^-$ and Bacillariophyceae ($r=0.528$), $\text{NO}_2^- + \text{NO}_3^-$ and total phytoplankton ($r=0.459$), Dinophyceae and total phytoplankton ($r=0.551$), Bacillariophyceae and total phytoplankton ($r=0.798$), other taxonomic groups and total phytoplankton ($r=0.529$), chlorophyll-a and Dinophyceae ($r=0.579$), chlorophyll-a and Bacillariophyceae ($r=0.726$), chlorophyll-a and other taxonomic groups ($r=0.514$), chlorophyll-a and total phytoplankton ($r=0.942$). Additionally, negative correlations were observed between temperature and pH ($r=-0.458$), $\text{NO}_2^- + \text{NO}_3^-$ ($r=-0.465$), TSS and total phytoplankton ($r=-0.440$), chlorophyll-a and PO_4^{3-} ($r=-0.442$).



Discussion

In this study, we tried to explore nutrient, phytoplankton interactions with respect to environmental parameters in the Dardanelles (Çanakkale Strait) during the winter period (02 December 2004-07 March 2005).

Temperature and salinity results showed that there were fluctuations in temporal distribution profiles of temperature and salinity especially in period of late January and early March due to intense vertical mixing of the counter-flows in the Dardanelles (Fig. 3). In a previous study by Turkoglu et al., 2006, temperature and salinity measurements showed high variability at the southern part of the Kilitbahir in the Dardanelles. The narrowing of the Dardanelles lead to different temperature and salinity values to the northeast and southwest of the Narrows between Kilitbahir and Canakkale. Temperature along the southeast coasts of the Narrows (between Kilitbahir and Canakkale) was also lower than the other coasts of the Dardanelles due to upwelling and especially fresh water discharges from the rivers such as Saricay, Kalabakli and Karamenderes to surface layer (0-10 m) in early spring period. The surface waters in the southern part of the Dardanelles were also more saline especially in the spring and winter seasons compared to other seasons (Turkoglu et al., 2006). Additionally, salinity variations effect behavior characters of the other bio-physicochemical variations due to different character of the lower layer waters. For instance, correlations between salinity and other physicochemical parameters indicated that TDS ($r=0.989$) and pH ($r=0.618$) were strongly affected by salinity variations.

Besides the temporal variations in the nutrient concentrations, especially the southern part of the Dardanelles receives notable nutrient inputs due to domestic wastes from the city of Canakkale and from the rivers such as Saricay and Kalabakli (Polat and Tugrul 1996; Polat et al. 1998; Turkoglu et al., 2004b, 2004c, 2006). Therefore, in some periods of this study, extra accumulation of inorganic nutrients was highly pronounced. Additionally, the observed maximum values in different periods were principally due to entrainment of the inorganic nutrient-enriched salty Mediterranean waters from the lower layer by intense vertical mixing with the western basin surface layer. In fact, it has been shown that nutrient concentrations encountered in the Mediterranean waters are controlled by the exchanges at the straits (Besiktepe et al. 1994). On the other hand, during its passage through the Dardanelles, the Black Sea surface water outflow loses much of its phosphorus and nitrogen via utilization and vertical loss (Polat and Tugrul 1996). Additionally, the salty Mediterranean inflow to the Marmara deep basin via the Dardanelles contains low nutrient concentrations (Polat and Tugrul 1996).

Correlations between PO_4^{3-} and Bacillariophyceae ($r=0.523$), between PO_4^{3-} and total phytoplankton ($r=0.453$) were similar to correlations between $\text{NO}_2^- + \text{NO}_3^-$ and Bacillariophyceae ($r=0.528$), $\text{NO}_2^- + \text{NO}_3^-$ and total phytoplankton ($r=0.459$) in the system. This indicated that phytoplankton density in the system was limited by both phosphorus and nitrogen. Furthermore, negative correlation ($r=-0.442$) between chlorophyll-a and PO_4^{3-} may pronounce the system is more limited by PO_4^{3-} than $\text{NO}_2^- + \text{NO}_3^-$. Some researchers believe that the western basin of the Mediterranean is either phosphate-limited (Codispoti 1989), or slightly nitrogen-limited in some areas (Beers et al. 1982; Krom et al. 1991; Owens et al. 1989). Additionally, there was an important positive correlation between PO_4^{3-} and $\text{NO}_2^- + \text{NO}_3^-$ ($r=0.752$). This may indicate that both PO_4^{3-} and $\text{NO}_2^- + \text{NO}_3^-$ highly limits the phytoplankton cell growth.



The chlorophyll-a concentrations ranged from 0.829 to 3.794 $\mu\text{g L}^{-1}$ during low and high productive periods, respectively. The observed early January (10 Jan. 05) and early February (01 Feb. 05) maxima were principally due to diatom *Pseudonitzschia pungens*, *Thalassionema nitzschioides* and *Chaetoceros* spp. blooms in the study area. Despite minimum values of 0.829 and 0.928 $\mu\text{g L}^{-1}$ at 15 and 20 December 2004, average chlorophyll-a concentration (2.180 $\mu\text{g L}^{-1}$) was above the 2.00 $\mu\text{g L}^{-1}$ during the winter period. High chlorophyll-a values and phytoplankton production capacity showed that the Dardanelles have high eutrophication structure in even winter period. Chlorophyll-a values in this study were higher than winter 2002 chlorophyll-a values in the southern area of the Dardanelles (Turkoglu et al., 2004b), in the Aegean Sea (Kucuksezgin et al. 1995) and in other parts of the Mediterranean Sea (Berman et al. 1986; Salihoglu et al. 1990). However, the values were lower than winter values in northern area of the Dardanelles (Turkoglu et al., 2004c) and winter values in Sea of Marmara (Tugrul et al., 1986; Polat et al., 1998). Similar to the variations in the physicochemical conditions and the nutrients, chlorophyll-a concentrations were also affected by the counter flows in the Dardanelles.

High phytoplankton cell density and high nutrient concentrations especially phosphate in winter period in January and February showed that Dardanelles can be eutrophicated from time to time, comparable to the levels found in the Black Sea (Turkoglu 1999; Turkoglu and Koray 2000; 2002; Turkoglu, 2005) and the Sea of Marmara (Polat and Tugrul 1995, 1996). Phytoplankton community structure was observed to be controlled by 3-4 diatom (*P.pungens*, *T.nitzschioides* and *Chaetoceros* spp.) and 1-2 dinoflagellate species (especially *Prorocentrum micans*) in the Dardanelles as shown in eutrophicated ecosystems such as the Sinop Bay in the Black Sea (Turkoglu and Koray 2000, 2002; Turkoglu, 2005) and Iskenderun Bay in the eastern Mediterranean (Polat et al. 2000). Other species can be considered as accessory species that do not cause significant fluctuations in the phytoplankton density and bio-volume as shown by many researchers (Pielou 1975; Lukatelich and McComb 1986; Turkoglu 1999). This study showed that the relationship between Bacillariophyceae and total phytoplankton ($r=0.798$) was more important than the relationship between chlorophyll-a and Dinophyceae cell density ($r=579$) and between chlorophyll-a and other taxonomic groups ($r=514$). These relationships showed that chlorophyll-a was highly controlled by cell density of Bacillariophyceae species than those of Dinophyceae and other taxonomic groups.

Due to coastal area and high terrestrial inputs by Kalabakli stream, high TSS values (9.40 and 140.1 mg L^{-1} ; mean 27.13 mg L^{-1}) were found in the Dardanelles during the winter period. But, these high TSS values were not related with phytoplankton and this was supported by a negative correlation coefficient between TSS and phytoplankton ($r=-0.440$). As a result of this study, we showed that the process of eutrophication is accompanied by a shift in the existing cell density relations between major taxa due to high nutrient concentrations. Additionally, we showed that contributions of dinoflagellates (%30.9) and diatoms (%48.76) to total phytoplankton in the Dardanelles in the winter period were similar to the Black Sea with respect to contributions of dinoflagellates (%40) and diatoms (%60) to total phytoplankton (Turkoglu, 1999; Turkoglu and Koray, 2002). Therefore, this short time series data may allow us to understand short time variations in phytoplankton and chlorophyll-a in relation to nutrients and other environmental parameters in surface waters of the Dardanelles and gives us a synopsis of the ecosystem.



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EVALUATION OF THE BLACK SEA DIVIDED COASTAL HIGHWAY PROJECT WITH AN ENVIRONMENTAL VIEW

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Highways have many impacts on environment. Many measures can be taken to prevent, to reduce or to compensate negative environmental impacts. The important point is to detect potential impacts at the planning stage, and to apply necessary measures in appropriate stages. In order to achieve this, a good planning process and an Environmental Impact Assessment (EIA) process combined with planning are necessary.

The Black Sea Divided Coastal Highway (BSDCH) is an open access divided road with 2X2 lanes. Since it passes mainly through coasts, it attracts settlement near it and it seems like an in-city road in many places. Although in many places there are suitable places for road construction in south, approximately 60 % of the road is built in filled areas and as a result, many environmental problems have come out.

In this study, drawbacks of the BSDCH Project were put forward as an example for possible environmental effects of highway projects. It was seen that the BSDCH Project has many negative impacts from many aspects (lack of EIA Report, structure stability, coast destruction and recreation, aesthetics, sea life and fishery, healthy urbanization and traffic safety, noise, air pollution, water impacts and drainage).

Keywords: *Black Sea Divided Coastal Highway, Environmental Impacts of Highways*

INTRODUCTION

All of the civil engineering projects affect their environments much or less, in a good or bad manner. Highways are civil engineering projects that have widespread impacts on the environment because of their being spread over the earth as a spider's web.

Nowadays, construction of a highway project is going on in Black Sea coasts of Turkey. Since existing transportation infrastructure of the East Black Sea Region of Turkey is inadequate, necessity of strengthening the east-west connection in the region for meeting agricultural, trading, social and economical needs of region's people and maximizing the benefits of the region's special geographical situation has revealed. Construction of the existing Coastal Highway had been completed in 1960's. As a result of the rapid growth in traffic values, necessity of reconstructing the highway as a divided highway appeared. Studies were started in 1998 according to new project, which had been adjudicated in 1997. Construction of the BSDCH, which will serve for nearly 8 millions of people in 6 provinces and 63 counties, is going on and is aimed to be completed in 2006. Because nearly 60% of it was constructed in filled areas, people of the region, environmentalists and other related organizations litigated about the BSDCH many times.



EVALUATIONS

Evaluation from Lack of Environmental Impact Assessment (EIA) Report

In a construction, if environmental impacts are not put forward before the beginning, measures may be insufficient. It is seen that the measures taken after the construction are more expensive but are not as effective as measures taken at the beginning. For this reason, at planning stage, all alternatives should be taken into account; the most appropriate alternative from economical, social and environmental aspects should be put into practice. Therefore, using EIA methodology in highway construction is very important.

As one of the preventing environmental policies developed for protecting environment, EIA was developed to predict the negative environmental impacts of an action before the beginning of the action and to detect necessary measures for reducing, preventing, or compensating these negative impacts. EIA is not only a report that evaluates environmental impacts, but also a method that contains technical, economical and social subjects in it. [1,2]

In Turkey, EIA Legislation [3] published by Ministry of Environment, classifies projects into two according to importance of their environmental impacts as Appendix-I and Appendix-II. In Appendix-I, highly polluting projects are listed and it is compulsory to prepare EIA Report for these projects. EIA Legislation states roads (motorways, expressways and state highways) as 8. item of Appendix-I and put them into group for which EIA Reports should be prepared. However; any EIA Report was not prepared for the BSDCH, showing the temporary 3. item of the Legislation as reason. The highway was excluded from the Legislation due to its being taken into investment program before the publication of Legislation in 1993. However, there are great differences between the highway designed at that time and highway constructed today. Project has changed many times during this period. That is to say, the existing project is a new project and it is compulsory to prepare an EIA Report for it.

The BSDCH is a highway, which is being constructed without taking the alternatives, feasibility studies and cost-benefit analysis into account. Also, any EIA Report was not prepared for the highway. If these studies were made seriously, it would be seen that there are better alternatives from ecological, economical and social aspects.

Evaluation from Structure Stability Aspect

The basic principle of civil engineering is safety. Safety is a must condition for a structure. It is revealed from the last 40 years experiences that the structures constructed on the coastal fillings and exposed to sea waves are not safe structures. [4] It is seen that the materials used in fillings are not strong enough. In some places, they can not resist sea waves and begin to break down into pieces with the effect of salty sea water and sun; even, they can be broken by hand in some places.

Coastal fillings have been constructed in the East Black Sea Region for 40 years, sea waves took these fillings, it was reconstructed and it has continued up to now like this. Coastal erosion in East Black Sea Region is very strong. So, the important damage will take place in medium and long range. As their bottom were carved (Figure 1.), filling that were constructed by placing the various size stones on beach, will be withdrawn into the sea. Many resisting structures can not resist against sea waves (Figure 2.).



Evaluation from Coast Destruction and Recreation Aspects

Sea coasts are suitable places for resting, enjoying, walking, sport and tourism. Therefore, they should be protected due to these properties and beauty. Because of these properties, they are evaluated as the common usage areas of society, even all mankind. [5] In case of destruction or wrong consuming of coastal areas, it will necessitate a long time period and investment to renew these areas, or in some cases, it will not be possible. With the construction of this highway, beaches, bays, precipices and recreation places, each of which are natural wonders and have been produced by sea in a very long time (millions of years), were destructed (Figures 3. and 4.).

Most of the BSDCH is passing through recreation areas. The identities of a coastal city are coast and sea. The physical obstacles (barriers) and structures that will prevent meeting of people with coasts and seas, are not harmonious with city planning principles. [4]

Because of the construction of the strengthening rock fills for roads, a barrier was formed between sea and land and thus, relation of region's native people with sea has broken down. Due to strengthening rock fill, reaching 8 m. in some places, cities having sea view before the road construction have black stone view now. In order to reduce this barrier impact of highway; under and over pedestrian crossings should be designed, relation of citizens with sea should be protected and social places where citizens may reach to coasts should be planned. [6]



Figure 1. Waves are carving the bottom of the fillings.



Figure 2. A resisting structure that can not resist against sea waves



Figure 3. Fener Bay (before the filling).



Figure 4. Fener Bay (after the filling).

Evaluation from Aesthetics Aspect

Because of the construction of rock fills parallel to coast, and cutwater structures constructed for protecting these rock fills from sea waves (and also creating beaches), cause a contrast with natural environment and create a visual pollution (Figure 5.). In order to reduce this visual pollution, some municipalities try (with their own efforts) to grow plants on the cutwater structures (Figure 6.) and strengthening rock fills (Figure 7.). Piraziz can be given as an example. Instead of single studies like this, vegetation should become a part of highway construction with a systematic study and thus, this visual pollution should be at least reduced.

Big stone quarries opened in mountain sides and emptied river basins formed due to road construction also create a big environmental problem. Mountain sides become unstable and grey parts arises in green valleys (Figure 8.). In these areas, improvement and vegetation studies should be made after the operating period and thus, both visual improvements should be achieved and stability of slopes should be maintained.



Figure 5. Cutwater structures, constructed perpendicular to coasts create visual pollution.



Figure 6. An example of plant growing on the cutwater structure.



Figure 7. An example of plant growing on the strengthening rock fills.



Figure 8. Stone quarries cause visual pollution.

Evaluation from Sea Life and Fishery Aspects

According to calculations made, about 60 % of the BSDCH is constructed on beach and sea fillings up to 30 m. depth, which is the richest part of the sea from sea species aspect. Coastal regions have vital importance for sea ecosystem. Every type of filling study in coastal regions will damage flora and fauna.

All life is between 0 and 200 m. depth in the Black Sea. High portion of fishery in the Black Sea takes place in near of shore lines. Especially, economically valuable fish species live in 0-20 m. depth. Because of the construction of the BSDCH, these areas had been filled and thus, food chain in sea was broken down. Also, as a result of damages in coastal regions, living beings in sea were either vanished or migrated.



Evaluation from Healthy Urbanization and Traffic Safety Aspects

Highways re-orientate not only traffic, but also land use, and attract urbanization on them. For this reason, to foresee the impacts of new planned highway route and to make healthy analysis about future have vital importance. Because the highway had been taken to coast in 1960's and no other highway was constructed passing through inner areas, all urbanization has been attracted to sea side and the region between Samsun and Sarp became a single linear city.

The BSDCH basically follows existing route. Depending on the settlement conditions of the region, passes from settlements, some of which are big cities. Share of in-city traffic in the total traffic volume is big in the region. Besides, dependency of small settlements to big settlements causes dense daily relations between these settlements and this increases the traffic in the road. Congestion can be seen even today in traffic flow especially in urban areas, and it will avoid flow of transit traffic in long term. Joining and diverging points of urban traffic to transit traffic will generate problematic points. [7]

The BSDCH will also be exposed to pedestrian traffic. Pedestrians are always under high risk in traffic. The connection of settlements with sea was broken down and adequate infrastructure was not been constructed to facilitate pedestrian crossing. It will not be a hard prediction to say the number of accidents will increase due to increased speed in this road that bind in-city and transit traffics. According to Highway Traffic Legislation [8], maximum speed in urban areas is 50 km/hr, whereas maximum speed in transit traffic is 90 km/hr. Drivers that set their speeds according to transit traffic will not decrease their speed in urban regions and thus, they both will cause accidents and will violate laws. Unfortunately, a lot of news about accidents is taking place in newspapers even today. For this reason, it is inevitable to cut the traffic flow in some suitable places and to make signalized junctions and pedestrian crossings. This means, on the other hand, decrease in average travel speed and increase in travel time. Therefore, expected benefits from the highway will not been obtained. [7]

Another factor that can be dangerous for traffic safety is waves coming up to highway parts close to sea in wavy days. In stormy days, sometimes not only waves, but also small stone-rock particles and sands come to road surface and endanger the traffic safety; even road can be closed temporarily.

Evaluation from Noise Aspect

One of the basic negative impacts caused by highways is noise pollution. Traffic-sourced noise is generally caused from engines, exhausts and suspensions of vehicles. Traffic noise varies depending on the distance between the city and the highway, type of road surface, inclination of road surface and, the type and amount of vegetation along the road. [9] From the literature, it can be predicted that the noise level in a dense road like this road will be about 65-90 Decibels. This noise level may have impacts like psychological impacts, ear problems and psychosomatic illnesses. First of the main factors affecting noise is the distance between road and the receiver. This is a very effective factor, determining whether the impact and sensibility of noise is high or low. In order to obtain an important amount of noise reduction, distance between the road and the receiver should be about 30-40m.



One other important factor creating noise disturbance on the receiver is the vehicle speed; as the vehicle speed increases, corresponding noise also increases. Increasing traffic volume also increases noise. Being in high or low level of the road also affects noise level. In roads, having a smooth surface, noise level is less with compared to asphalt or concrete road surface. [9]

In the construction of this highway, these factors have not been taken into account. The BSDCH with its dense traffic has passed through settlements, instead of decreasing the road level, it was increased in many places. Any noise barrier has not been constructed and any special remedy has not been decided in the selection of surface material type. Passage of this highway from the settlements has increased the noise impact, which is already heavy in urban areas.

Evaluation from Air Pollution Aspect

One and may be the most important negative environmental impact of highways is air pollution. Air pollution is harmful for both living being health and economy. There exist 5 important main polluters from importance and source aspects that constitute about 90 % of all polluters. These are; Carbon Monoxide (CO), Sulfur Oxides (SO_x), Nitrogen Oxides (NO_x), Hydrocarbons (HC), Particulate Matters (PM) and others (Lead Radon, etc.). [10] Transportation sourced air pollution has a big share in total air pollution. Highest emissions of CO, HC and NO_x are produced by vehicles. For example, in the list of CO producing polluters, motorized vehicles are in first place with 66% share. Motorized vehicles are also leader in HC emission about 12 % shares and in NO emission about 6% shares. Else, lead, arsenic and aldehyde emissions especially from automobiles with benzine motors, are significant. [10,11]

Because the BSDCH passes through settlements in many places, air pollution problem in settlements gets heavier and the emissions of urban and transit traffic were overlapped. Since old road had attracted settlements to shoreline, air flow coming from sea was screened by buildings. By the construction of this new road, this situation will be stiffened. There will be no air flow in screened cities and the impacts of air pollution will be felt heavier.

Evaluations from Water Impacts and Drainage Aspects

Highways cause changes in natural water environment. Roads generally modify the natural flow of surface water by concentrating flows at certain points and, in many cases, increasing the speed of flow (Figure 9.). Depending on local conditions, these changes can contribute to flooding and soil erosion. [12]

The rainiest region of Turkey is the East Black Sea Region. While average of Turkey is about 650 mm, annual rain amount in east of region may be about 2,5 m. In snow melting seasons and in intensive autumn rains, big floods and landslides frequently occur in the region. [13] The strengthening rock fills and filling behind it may be as high as 5-6 meters from sea level and they let many settlements in pit (Figure 10.).



However much there are culverts for drainage, the culverts which are too long and have a slight slope, will not work very easily and will be filled with residual materials due to lack of maintenance. So, probability of floods in many settlements of this rainy region is very high. The flood occurred after an effective rain in Sürmene in 23.07.2002 may be given as an example. Although it was not the only reason it is a fact that the highway fill has increased the severity of the flood by making a barrier impact.

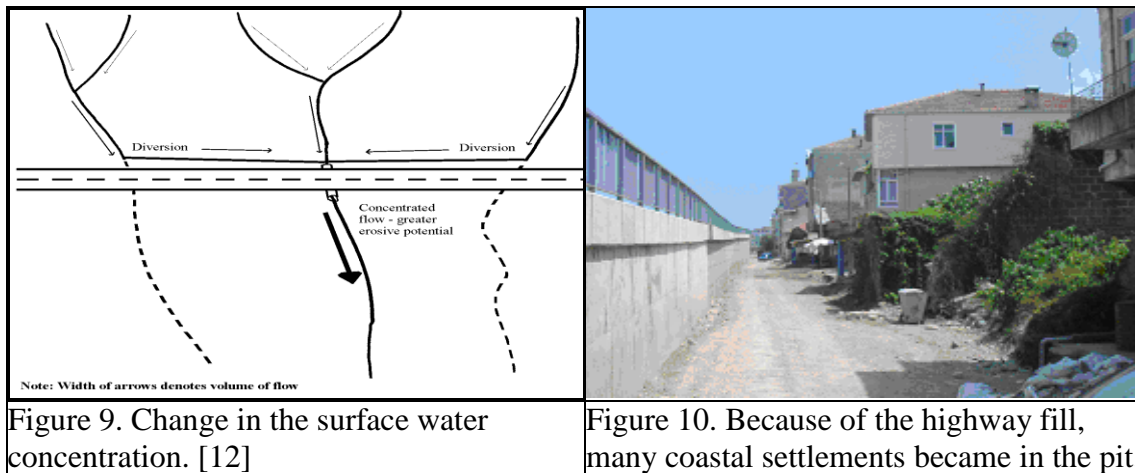


Figure 9. Change in the surface water concentration. [12]

Figure 10. Because of the highway fill, many coastal settlements became in the pit.

RESULTS

Because of the rapid growth in transportation sector in last years, this sector has become the most important polluter sector. Especially in big cities, transportation sourced environmental pollution may threat human life. Today, sustainability concept, which takes environmental aspects as well as economical and social aspects of transportation into account, has become the most important dimension of transportation. A highway project should be evaluated not only with its geometry and capacity, that is its technical properties, but also with its environmental compatibility. To prevent negative environmental impacts related to highway, or reducing these impacts, is related mostly with its location. To prevent, to reduce or to compensate negative environmental impacts of highways, many measures can be taken. The important point is to detect potential impacts before the construction and take necessary measures in appropriate stages. At this point, importance of Environmental Impact Assessment (EIA) studies reveals.

As mentioned before, in spite the fact it is compulsory according to EIA Legislation in Turkey, any EIA Report was not been prepared for the BSDCH, showing the temporary 3. item of the Legislation as reason. If an EIA Report was prepared for this project; either another route would have been selected or compensating remedies would have been taken and project would have been improved.



In order to make the BSDCH beneficial to country, detailed projects and remedies should have been decided with care. Local properties should have been taken into account at full length of the road. Public benefit related to region should have been discussed. It is not possible to protect and to live coast in another place, it is not possible to create destructed beauties in another place; but alternatives of this transit road might have been looked for. The cost of destruction of environment and the cost of restriction of citizens to access sea can not be measured.

When the principle of creating fill areas only in special cases and by taking the ecological properties into account, it is revealed that fill areas can be created to present coastal places for the city, where recreation areas, coastal areas or public areas are limited. All structures on fill areas should be such areas that rise living quality of citizens and are open for public. The main principle in usage of coasts is free accessibility of coasts. Therefore, it is not possible to construct a transit road like the BSDCH which will restrict citizens' access to sea and will work as a barrier in the coasts.

To conclude; it can be said that, the BSDCH, which is today at finishing stage, has negative environmental impacts from many aspects (lack of EIA Report, structure stability, coast destruction and recreation, aesthetics, sea life and fishery, urbanization and traffic safety, noise, air pollution, water impacts and drainage). Today, it is necessary to reduce these impacts as much as possible and compensate them, and these impacts should be taken into account in future projects.

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SENSITIVITY OF TURKISH PRECIPITATION TO SST VARIABILITY IN THE SURROUNDING SEAS

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This study investigates the linkage between precipitation variability in Turkey and sea surface temperature variability in surrounding seas through sensitivity experiments using a state-of-the-art regional climate model. Sea surface temperatures of five regions including western half of Black Sea, eastern half of Black Sea, Aegean Sea, Eastern Mediterranean Sea and Central Mediterranean Sea are individually modified by ± 2 °C in the model sensitivity simulations, and the results from these simulations are compared with a control simulation to quantify how these changes affect the Turkish precipitation. In general, the results of the sensitivity experiments show that the response of Turkish precipitation to sea surface temperature changes in the surrounding seas is limited and mostly confined to the coastal areas in Turkey. Increasing sea surface temperature usually increases rainfall in the vicinity of the perturbation, and similarly, decreasing it reduces rainfall. Monthly results indicate that Black Sea regions mostly affects Turkish precipitation in October and November, Aegean Sea in December and Mediterranean regions in January, which may be related to cyclone tracks and frequency in these months.

1.INTRODUCTION

Regional climate changes in Mediterranean region has been of interest to researchers for many years since it is located in a transitional zone in which mid-latitude and tropical variability play a key role in determining climate characteristics of this region. In addition to this, it has many morphologic, geographical, historical, and societal characteristics that make its climate interesting per se. (e.g. Bolle 2003). Although much of the coastal states has a Mediterranean climate type, there are also regions that have different climate characteristics due to complex topography, elevation differences, and latitudinal positions. Previous and recent studies concerning with regional climate changes, which especially pointing out precipitation variability in Mediterranean region, are mostly focused on large-scale circulation patterns and atmospheric teleconnections (Trigo et al., 2000; Maheras et al., 2001; Xoplaki et al., 2004; Trigo et al., 2006).

Studies concerning with the relationship between sea surface temperature (SST) and precipitation variability have mostly focused on the tropical oceans (Arpe et al., 1998, Janicot et al., 1998; Messenger et al., 2004). It is only very recently that studies for the relationship between SST and climate variability have been done for the Mediterranean region. Li (2006) studied the atmospheric response to an idealized 2 K cooling of the Mediterranean Sea with a General Circulation Model (GCM) and he demonstrated large-scale atmospheric responses to this cooling. Rowell (2003) also studied the role of the Mediterranean Sea in the Sahelian rainfall season with a GCM. He found an increase in moisture transport in the eastern part of the Sahara resulting in an increase in the Sahelian summer rainfall due to warmer Mediterranean Sea (Li, 2006).



Turkey, a country in the eastern Mediterranean, is surrounded by three seas: Black Sea in the north, Aegean Sea in the west and Mediterranean Sea in the south. In the cold half of the year, cyclones originating from the North Atlantic region bring over moisture-laden air to Turkey and cause a lot of rainfall, especially in the coastal areas of Turkey due to orographic effects. Cyclones that affect Turkey usually follow four different tracks as identified by Karaca et al. (2000) (Figure 1). There is no doubt that any variation in the intensity and frequency of these cyclones will cause variation in the precipitation in Turkey. Because the cyclones pass through the surrounding seas before reaching to Turkey, SSTs may play a role in the amount of rainfall in Turkey as they modify the overpassing air masses to some degree. The present study, therefore, investigates whether/how the variations in the SST of the surrounding seas affect the rain falling in Turkey. In order to achieve our goal, using a state-of-the-art regional climate model we have conducted sensitivity experiments involving ± 2 °C perturbations in SSTs at preselected five regions in the three seas surrounding Turkey.

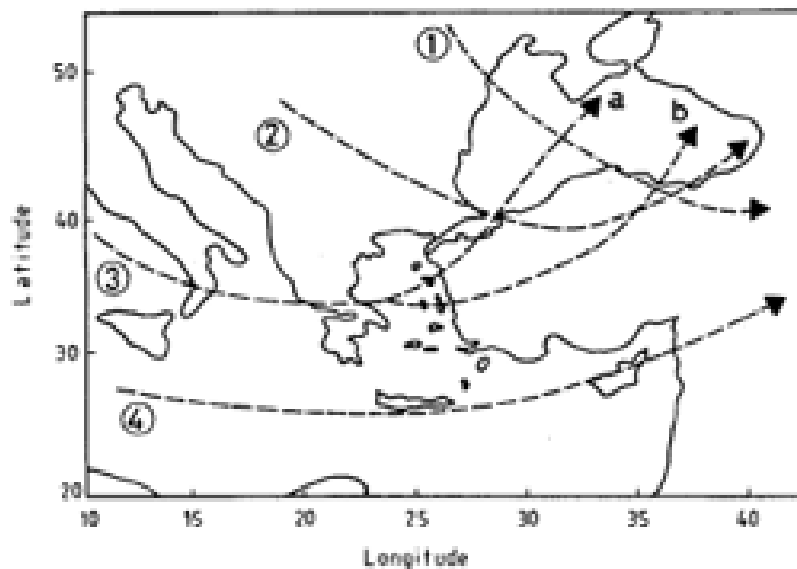


Fig.1. Paths of cyclones influencing Turkey (adopted from Karaca et al., 2000)



2. MODEL DESCRIPTION and EXPERIMENTAL SETUP

2.1 Model Description

RegCM3 is the regional model used in this study and it is the third version of a regional climate model developed by and is maintained at the International Centre for Theoretical Physics, in Trieste, Italy. The first generation of RegCM included the Biosphere-Atmosphere Transfer Scheme, BATS, (Dickinson et al., 1986) for surface process, the radiative transfer scheme of the Community Climate Model version 1 (CCM1), a medium resolution local planetary boundary layer scheme, the Kuo-type cumulus convection scheme of (Anthes, 1977) and the explicit moisture scheme of (Hsie et al., 1984). RegCM was originally built upon the National Center for Atmospheric Research-Pennsylvania State University (NCAR-PSU) Mesoscale Model version MM4, which is a compressible, finite difference model with hydrostatic balance and vertical σ -coordinates in the late 1980s. The model physics and numerical schemes were then upgraded resulting in a second generation of RegCM called as RegCM2 originally developed by Giorgi et al. (1993a,b). The physics of RegCM2 was based on that of the NCAR Community Climate Model version 2 (CCM2) (Hack et al., 1993), and the mesoscale model MM5 (Grell et al., 1994). Since then, there has been major improvement in the physics of the model and associated software system, including a large-scale cloud and precipitation scheme which account for the subgrid-scale variability of clouds (Pal et al., 2000), new parameterizations for ocean surface fluxes (Zeng et al., 1998), and a cumulus convection scheme (Emanuel and Zivkovic-Rothman, 1999).

2.2 Experimental setup

In this study, RegCM3 has been set up for a domain centered at 40° N, 32° E with 135x85 grid cells, which have 30 km spatial resolution, using a Lambert Conformal projection (Fig. 2). For each of the five different regions depicted in Figure 2, we have devised to carry out 3 simulations including a control, an SST+2 °C perturbation and an SST-2 °C perturbation. Control simulations involve no change to SST, however, the perturbation simulations involve changes in SST at these regions. The simulations are planned to cover the 6-month period from October to March between the years of 1990 and 2000. NCEP-NCAR (NNRP2) reanalysis data set is used for the initial and boundary conditions. The topography and land use are interpolated to the model grid points from a global dataset at 10 minute resolution. Figure 2 also shows the topography of the domain.

We firstly treated Aegean Sea (1st region) and completed the 10-year simulations for all three cases (control, SST+2 °C and SST-2 °C). Other simulations are currently in progress, but we were able to complete control and SST-2 °C perturbation simulations for the remaining four regions for only one year (cold half of 1994-1995) to have an idea about their effects on the Turkish precipitation.

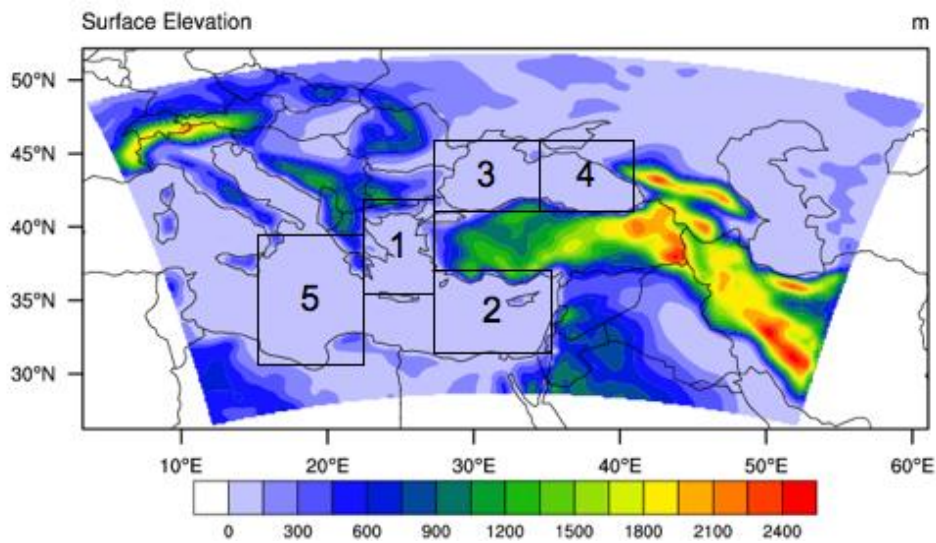


Fig.2. The domain and topography used in the RegCM3 simulations. The five rectangles show the five regions where SSTs are changed in sensitivity simulations.

3. MODEL PERFORMANCE

Before demonstrating the sensitivity results, it is important to present model performance in simulating large scale circulation and precipitation patterns. Figure 3 shows 10-year December-January-February (DJF) average of 850 mb geopotential height maps from

NCEP/NCAR Reanalysis and RegCM3 model output. It seems that the model is able to reproduce the 850 mb geopotential height fairly well.

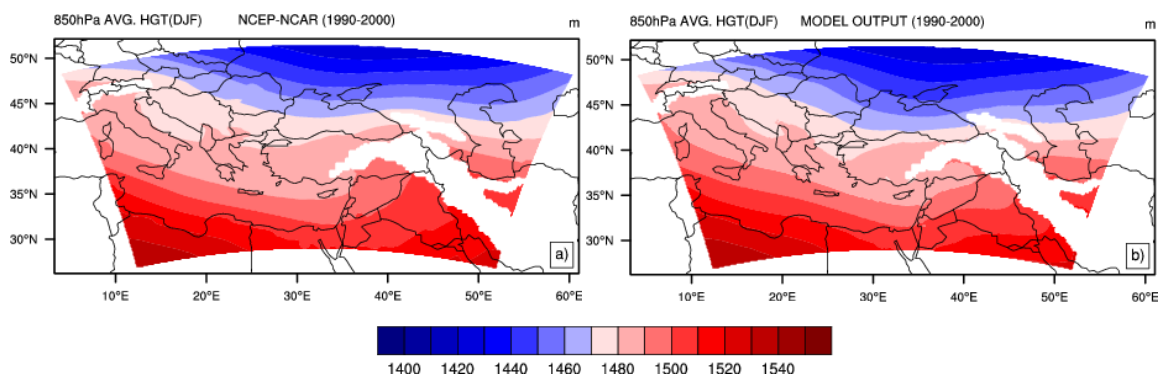


Fig.3. 10-year DJF average of 850 mb geopotential height maps from NCEP/NCAR Reanalysis (a) and RegCM3 model output (b).



Figure 4 shows 10-year average precipitation values (mm/day) for DJF from gridded observations (CRU data) and model output. In general the model captures the primary features of the rainfall distribution accross the domain. It seems that the CRU data are somehow missing the high precipitation amounts at the mountaneous eastern Black Sea region. The model on the other hand gives more reasonable estimations of precipitation in these areas.

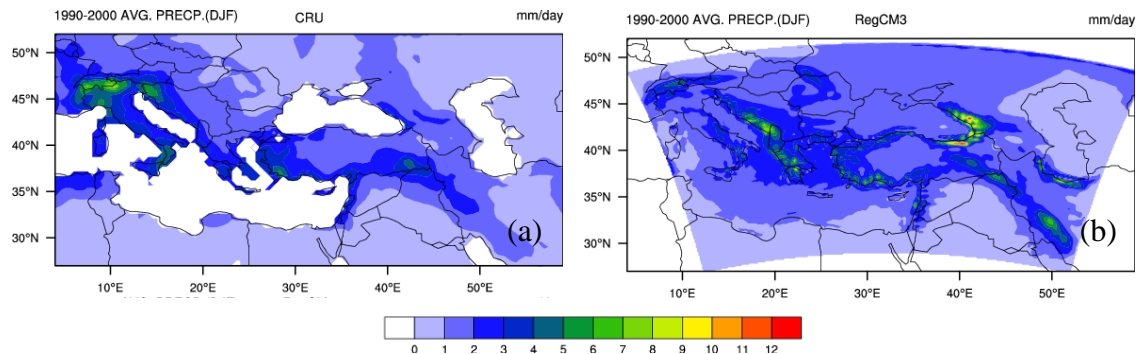


Fig.4. 10-year DJF average of rainfall distribution from CRU Observation data (a) and RegCM3 model output (b).

After comparing model outputs with observed and reanalysis data, it is assumed that the model performance is adequate to carry out sensitivity experiments to investigate the effects of SST perturbations in the surrounding seas of Turkey on its precipitation.

4. SIMULATION RESULTS

i) Aegean Sea Sensitivity Results

Figure 5 shows the 10-year average DJF difference in precipitation between perturbation simulations and control simulations. It can be said that decreasing or increasing Aegean sea surface temperatures by 2 °C affect mostly the precipitation falling at Aegean Sea and the coastal areas surrounding this sea in winter. Highest changes occur in the westernmost coasts of Turkey. It is also important to emphasize that a decreased SST results in reductions in precipitation and an increased SST results in increases in precipitation, a somewhat quasi-linear relationship.

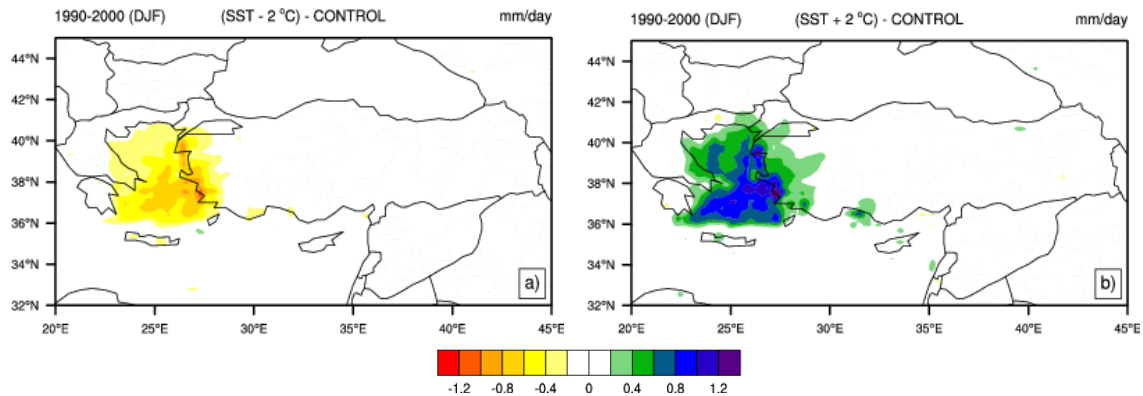


Fig.5. 10-year average DJF difference of precipitation between perturbations and control simulation. (a) (SST - 2 °C) – Control, and (b) (SST + 2 °C) – Control.

When we look at the individual months (Figure 6), we can see that the changes in precipitation occur in Aegean Sea and immediate surrounding lands. One of the most striking change takes place in December when reduced SST in Aegean Sea causes substantial declines in rainfall along the westernmost coastal areas of Turkey (Fig. 6c). Similar inferences could be stated for SST+2 °C perturbation. Highest changes in precipitation occur in December in that experiment too (not shown here).

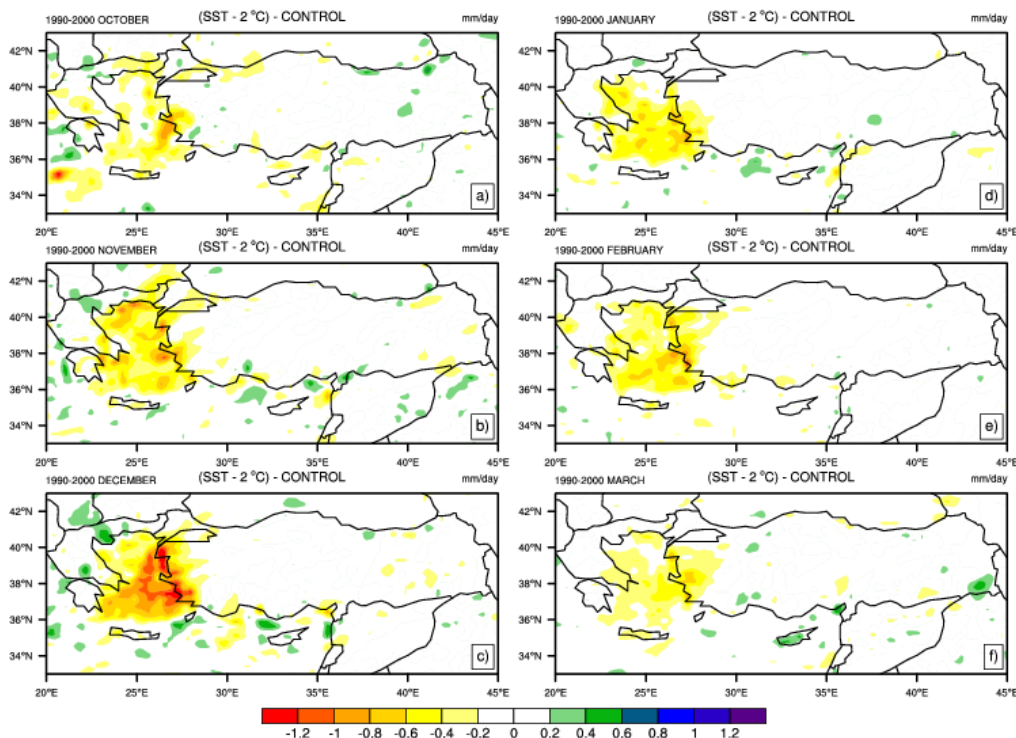


Fig.6. 10-year average monthly difference of precipitation between SST-2 °C perturbation and control simulation.



ii) *Results from 1-year simulation of other seas*

A single-year sensitivity simulation may contain a lot of noise, and therefore, it may be difficult to identify signals properly. Conducting multi year or ensemble sensitivity simulations is expected to eliminate this problem, at least partially. Moreover, multi year simulations take dry and wet as well as normal years into account, thus getting closer to, what's called, climatology. In this study, we have completed the Aegean Sea sensitivity experiment for ten years between 1990 and 2000, however, the other experiments involving the remaining four regions are not complete yet and they are currently in progress. Nonetheless, in order to have a taste of how the SSTs of those four regions affect Turkish precipitation we first carried out a single year experiment instead of completing one region's multi year simulations at a time. For this, we have selected a normal year (1994-1995) in terms of precipitation in Turkey. Figure 7a shows the DJF precipitation difference between SST-2 °C perturbation and control for the second region that covers eastern Mediterranean Sea. Sensitivity experiment for region 2 indicates large scale reductions in rainfall at the region itself, but highest reductions occur towards eastern and northern boundaries of the region. Reductions take place in the central parts of eastern Turkey too.

Figure 7b shows the changes in DJF precipitation as a result of reducing SSTs in the third region covering approximately the western half of Black Sea. It seems that SST perturbation in the western half of Black Sea has little or no effect on Turkish precipitation. Most of the response at distant areas are noise as they can be seen in Figure 7c that shows the DJF change

in precipitation with respect to SST perturbation in the eastern half of Black Sea. We have noticed when we looked at the monthly response maps (not shown here) that Black Sea perturbations have substantial coherent effects in October and November, but they have little effect in other months in general. Figure 7d shows the effect of perturbing central Mediterranean SSTs. In this case, large scale reductions are evident in central Mediterranean and the lands to the North, especially Greece. Turkey seems to be less affected by this perturbation.

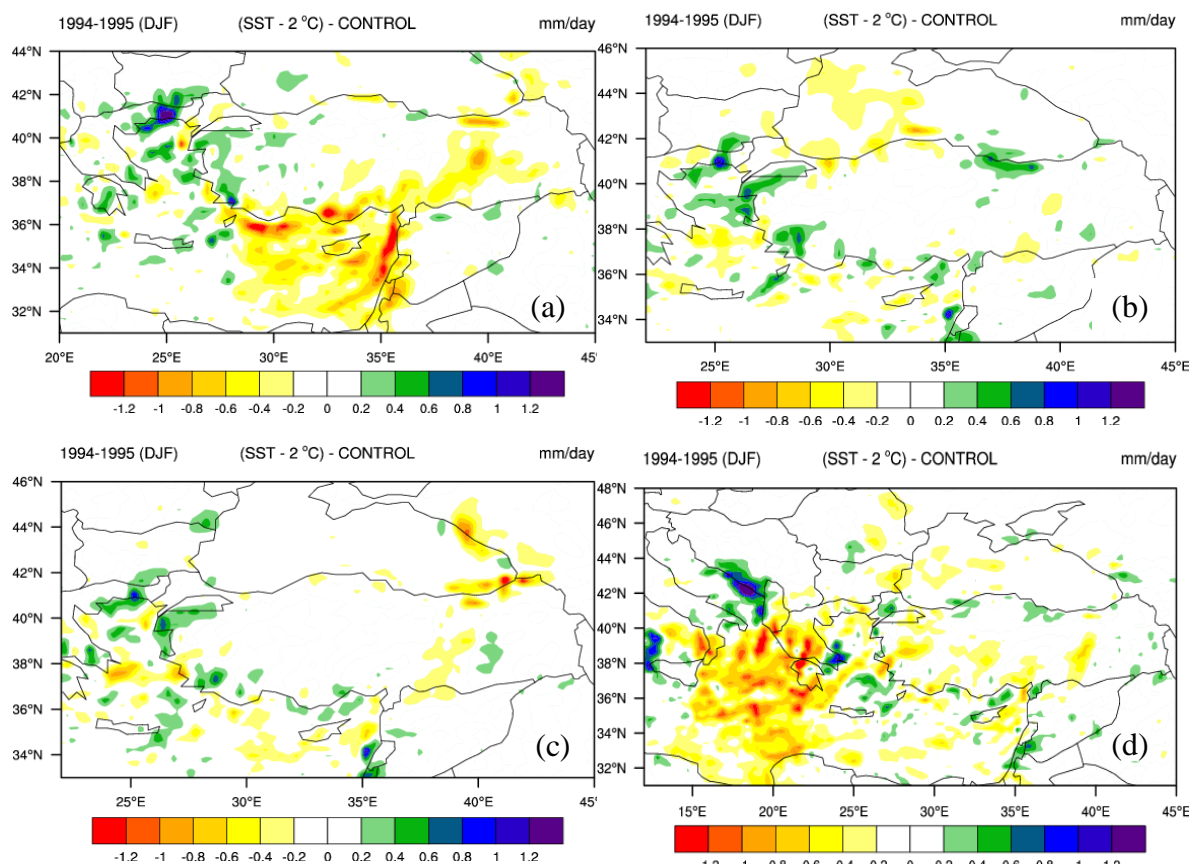


Fig.7. Single year (1994-1995) DJF precipitation differences between SST-2 °C perturbation and control for the four regions; (a) East Mediterranean, (b) West Black Sea, (c) East Black Sea, and (d) Central Mediterranean.

5. CONCLUSIONS and DISCUSSION

Previous studies have investigated precipitation variabilities of Turkey in conjunction with large-scale circulation patterns and atmospheric teleconnections. This study investigates the linkage between precipitation variability in Turkey and sea surface temperature variability in surrounding seas through sensitivity experiments using a state-of-the-art regional climate model. We have designed several experiments to study the roles of different sea basins on Turkish precipitation, but we were able to complete only the one that is related to Aegean Sea due to limitation in our computing resources. The other experiments, whose only single year simulations are available, are currently in progress. In general, the results of the sensitivity experiments show that the response of Turkish precipitation to SST changes in the surrounding seas is limited and mostly confined to the coastal areas in Turkey. Aegean Sea perturbation experiments indicate rainfall changes mostly in Aegean Sea and westernmost areas of Turkey in winter. Increasing SST, in general, increases rainfall in these areas, and reducing it decreases rainfall. Similar responses are obtained for individual months, but the strongest response to SST perturbations in Aegean Sea occurs in December.



SST perturbations in the Eastern Mediterranean region affect immediate sea and land areas in winter. Individual months (not shown here) indicate that this region has the potential to influence rainfall in the mountainous areas of eastern Turkey. Winter precipitation of Turkey seems to be not affected by the SST perturbations in Black Sea. However, these perturbations have the potential to influence fall precipitation in Turkey. SST perturbation in the central Mediterranean region has more influence on precipitation in Greece than that in Turkey. Based on monthly results, it can be said that Black Sea regions mostly affects Turkish precipitation in October and November, Aegean Sea in December and Mediterranean regions in January. This may be related to cyclone frequency and routes in these months. Cyclone tracks usually shift southward from October to January.

For the future, we are planning to complete multi-year simulations for all regions, as this is important to reduce model noise and to obtain wet and dry year responses to these perturbations. In addition, we will analyze the simulations in terms of positive and negative modes of North Atlantic Oscillation and North Sea – Caspian Sea pattern. We would also like to look into how the individual severe precipitation events in Turkey are affected by these SST perturbations.

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CONSERVATION OF SEA TURTLE ON A NESTING BEACH IN SAN JUAN DE LOS PLANES, BAJA CALIFORNIA SUR MEXICO

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Sea turtle conservation has met with a good success in the last two decades in Mexico; nevertheless, due to the extensive coasts, both in the eastern and the western side of the country, it is very difficult to conserve all the nesting sites. Besides sea turtles, there is a richness of seabirds and shorebirds that are found along the shoreline and also face many conservations problems. Finally, the littoral itself is suffering the pressure of human immigration and development. The study area (Lat 24°23'N and 23°58'N and Long 109°57'W and 109°46'W), at the southeastern end of the Baja California peninsula, is limited to the north by a seasonal stream bed, that may carries high volumes of water only during the hurricane season; when the sandbar closes at the end of the rainy season, it becomes a small lagoon. At the southern extreme of the study area, lays a small protected bay. This entire coastal zone is due for extensive developments related to tourist resorts, which highly jeopardize with the future of this wildlife. Even at present time there is a daily movement of off-road vehicles along the beach and on the adjacent dunes. We have been visiting the area during the last two years and keeping records of the nesting turtles. One of the main problems we have met, is the heavy use of the beach that prevent us from finding many of the nests, since the turtle tracks are erase or the eggs are taking by poachers. Besides, the night traffic might deter many females from coming to the beach. Another impact on the turtles is the presence of fences and constructions made by the beach front owners. In the years to come the development of resorts will greatly increment the impacts on wildlife. In order to propose a conservation plan we are compiling information on the presence of shorebirds on the north end lagoon, besides sea turtle nesting data. The lagoon is used by at least 20 species of shorebirds during their spring and fall migrations, and some of them stay here during the winter. Until now the surroundings of the lagoon are not being developed. In the coasts of Baja California Sur (BCS) are found 5 species of sea turtles, of which at least two are nesting in the study area. Nevertheless, we have found carcasses of all of them, except *the leatherback*. We will present results of three seasons of turtle surveys and observations on shorebirds. Besides, we will propose conservation measures to reduce the impacts of the present activities as well as from the future developments.



Introduction

The major threats to sea turtles are the human modifications of the environment, which has caused the alarming diminution of many populations around the world. Among these affected populations are those to all the species present in the occidental coast of Mexico. The destruction and continuous disturbance of the nesting habitat along the beaches, incidental catch in the coastal fisheries (juveniles and adults), the egg poaching, the capture of nesting females for food, the pollution of the marine and coastal environment, the ingestion of plastics and other human discards, are among the major responsible factors of the diminishing populations. Recently, another threat comes to increase the human pressure on sea turtles, the coastal development related to tourism, which includes from low impact developments to huge resorts, that uses big extension of coastal areas. A major conservation effort is required to preserve their populations around the world (Marquez 1996, INE-SEMARNAP 1999).

The species of sea turtles present in Baja California Sur (BCS), Olive ridley (*Lepidochelys olivacea*), green (*Chelonia agassizii*), leatherback (*Dermochelys coriacea*), hawksbill (*Eretmochelys imbricata*) and loggerhead (*Caretta caretta*) (Caldwell 1962, Fritts et. al. 1982, Clifton et. al. 1995, Marquez 1996), are all found in the study area. Here we find feeding grounds, as well as, nesting beaches, although our study concentrates only on nesting females that come to shore.

There are natural events, such as hurricanes and rainstorms caused by the convergence of a warm and a cold front that might cause considerable damage on nests. In this manner, hurricane John that hit Los Planes on September 2nd, 2006, destroyed most of the nests reported until then. Nevertheless, most of the environmental distress is caused by human activities, like use of the beach by fishermen, tourists or local people, who have direct impact on the nests and the females, by destroying or predating on the eggs and turtles. The increasing use of the coastal zone for tourism, brings a deep landscape modification. The construction of resorts, villas, resting housing, golf courses, roads, airports and marinas, are on the agenda for coastal developments in BCS; this is to attend a massive traditional tourism that is favored against forms of nature oriented alternative tourism. There are two mega projects planned in Los Planes: Punta Arena de la Ventana and Bay of Dreams. Besides, the entire beach front, up to 1500 meters inland, is being developed (Fig. 1).

Such coastal development will imply major environmental modifications, including drastic changes in the sand dunes, which will affect the nesting of sea turtles and the use of the coastal habitat by birds. This is one of the main reasons to accelerate the studies on the fauna and be able to propose conservation and management strategies.

This study is intended to identify the main nesting areas of sea turtles; the span of their breeding season, the habitat used by shorebirds, and assesses the types of human disturbance, in order to identify the main factors of disturbance and propose a corrective management in each case.

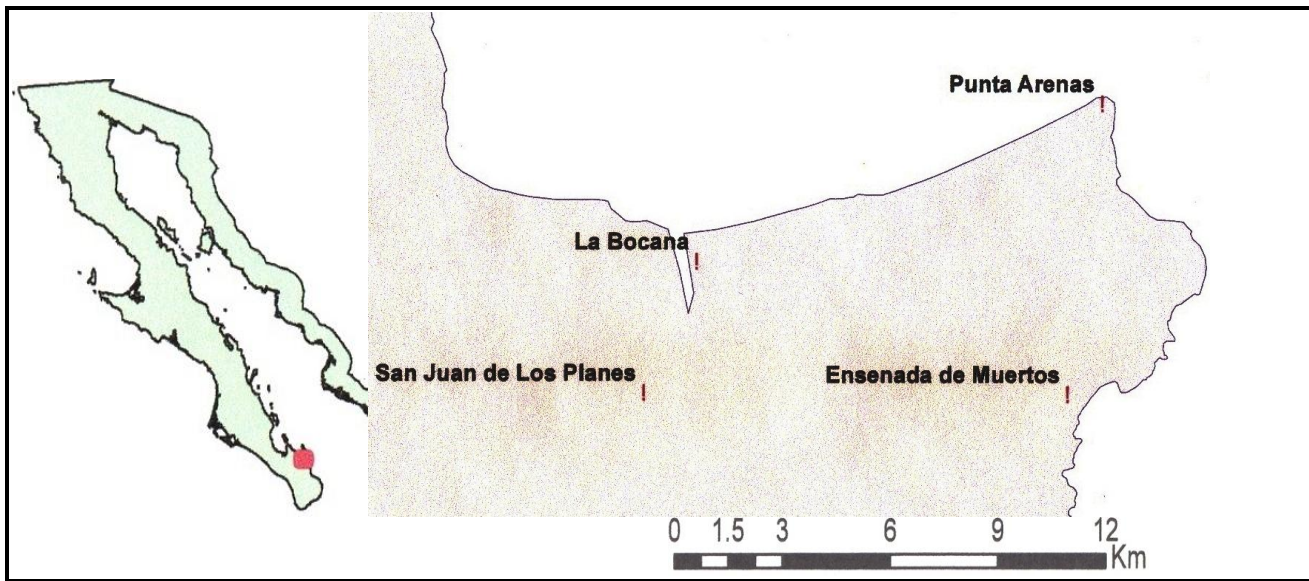


Figure 1. Study area at San Juan de Los Planes, Baja California Sur, México.

Study Area

The study area is within the Delegation of San Juan de Los Planes, and located from Lat. $24^{\circ}23'N$ to $23^{\circ}58'N$, and Long. $109^{\circ}57'W$ to $109^{\circ}46'W$. It covers a beach front from Ensenada de Muertos (EM) to La Bocana (LB) (Fig. 1). Behind the beach front, run the sand dunes, covers by vegetation 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 & Guzman 1998, INEGI 2001). The area was divided into two sections; the one to the south covers EM, a small and protected beach, only 1.5 km long. The one to the north runs for about 13 km, from Punta Arenas (PA) to LB. Both sections are separate, by a strip of mainly rocky shoreline about 9 km long, which was not surveyed. La Bocana is the outlet of a seasonal stream to the Sea of Cortez, whose mouth is closed by a sandbar for most of the year. It is the most important wetland within the study area. It is located at $24^{\circ} 01' 41'' N$ and $109^{\circ} 55' 56'' W$, and varies from about 150 meters wide by 250 meters long, to more than 2000 meters long; its size being dependant on the amount of rain during the hurricane season. It also may form a second lagoon of about 30 by 100 meters, but these dries more often. Like most of these wetlands habitats along the coast, it is a stopover for many shorebirds.

Methodology

Nocturnal and dawn surveys were done during the breeding season, along the beach to locate the sea turtles nests (from July to December). These surveys were run using ATV's, but mainly by walking the beach. The shoreline from LB to PA was divided into two transect lines of 10 and 3 km, respectively. When a turtle nest is located on the beach, its position is determined with a GPS, a paper format is filled with the data and a photographic record of each event is kept. The permit given to us by the Ministry of the Environment (SEMARNAT), does not allow us to touch the animals or the nests, so we cannot measure the turtles.



Surveys and interviews were carried out in the community of Los Planes to inquire about the use they have traditionally done of this resource, and to get information about the abundance of the turtles in the past. At the present time there is a decree, from 1990, that totally protects the sea turtles, making it illegal to collect or possess any sea turtle or part of it, so is difficult to get information on the present use the community does of animals and nests. Nevertheless, there is considerable level of poaching that can be partially detected.

Two shorebirds censuses were carried out walking along the shoreline of the lagoon at LB. Since hurricane John hits the area in September, 2006, the mouth of this river bed (locally called arroyos) has been open, so there is mixing of salt and fresh water. There is no running water in the arroyo. The surveys were done early in the morning, when the birds are active feeding and the light conditions are the best. We used 8X binoculars to do the identifications.

Results

Sea Turtles

Two species of sea turtles nest here, *Lepidochelys olivacea* and *Chelonia agassizii*. The Olive Ridley was observed nesting, but in the case of the Green Turtle was only identified by the tracks and nesting beds. The clutch size of Olive Ridley, obtained by counting the shells once the hatchlings depart, ranges from 60 to 150 eggs. In the case of the Green turtle, all nests detected in 2005, were destroyed by the transit of vehicles and by poaching. In the case of the Leatherback, one nest was reported by a guard at the entrance of a private property, at the end of July, 2005, sadly the eggs were taken by poachers soon after the female returned to the ocean. The 65 surveys and interviews done in Los Planes, shows that the leatherback is a less common breeder here, but people is familiar with the presence of this species.

Along the beach from Punta Arenas to La Bocana (PA-LB) there are two main breeding sites, one is half way along the beach, and is about 2 km long. A mean point for this site is 24°02'14.7''N and 109°53'09.4''W. The second site is a stretch of 3 km from La Bocana to the North (Fig. 1). Both sites have a 45° slope, light beige sand and the grain size goes from medium to fine. Behind the beach the dunes are low and with a soft slope. The third nesting site is at Ensenada de Muertos, runs along the south half of the beach. Here the sand is white and fine; the slope is less than 45°, but the dune is high and the slope towards the beach is very steep. While in the first two sites the turtles can wander into the dune, looking for a nesting site, in the third site they cannot get behind the beach. In the PA-LB beach, fencing by private owners, impedes the turtles for going any further. This could explain why many females return to the ocean without egg-laying. The nesting season goes from July to December, but most of the females come to shore between August and November.

The most disturbing human action is the traffic of all terrain vehicles from trucks to ATV along the beach, impacting more in PA-LB, than EM, since they compact the sand over the nest. A second factor of disturbance is poaching; in this case we have to relay on the data obtained in the field, since the surveys and interviews hide this action. A third important factor that causes distress is the fencing and construction of private houses on the beach front, affecting seriously the sand dunes. These impacts impede the free access of the turtles to their nesting sites, so the females have to look for a lower quality site and being more exposed to predators, such as dogs and coyotes, or return to the ocean.



The turtles are very sensitive to artificial lights and movement, so the presence of lamps and the movement of vehicles or people will deter them from coming to nesting. The use of lights, mainly facing towards the ocean is actually a serious problem, but probably one easier to solve.

Many of these problems could be avoided if the government, correct the delimitation of the 20 meters of Federal Zone along the beach. Considering the dynamic of the coastal line, the Federal Zone, should be reviewed periodically, and also should be much wider, than the 20 meters at the present time.

During the 2004 season, a total of 26 crawls were observed, which resulted in only twelve detected nests, but only half hatched, producing 470 hatchlings. Of the other six nests, in two of them the embryos did not develop, another two were devoured by dogs and the last two destroyed by high tides. During the second season the field efforts increased, but like the year before most of the surveys were done by walking, since there was only limited disposition of an ATV. This means that at most we were able to walk the length of the beach once or at most twice a week, so missing many of the nests or crawls. In this second season there was an increment of the events, to almost twice as compared to the first season, but the number of successful nests was considerable less, reaching only three, which produced 324 hatchlings. Most of the crawls were lost because the heavy nocturnal traffic on the beach.

YEAR	LOCALITY	EVENTS	NESTS DETECTED	HATCHED NESTS	FALSE CRAWLS
2004	EM	5	5	3	0
	PA-LB	21	7	3	14
2005	EM	8	6	2	2
	PA-LB	36+2?	33	1	3

Table 1. Results of the 2004 and 2005 nesting seasons.

EVENTS = Total number of crawls detected, resulting on nesting or not.

FALSE CRAWL: When the female exits the water without digging a nest. The false crawl usually occurs because the turtle was disturbed or it could not find a good nest site.

EM. = Ensenada de Muertos

PA-LB = Punta Arenas - La Bocana

2? = It means that these two events were impossible to classify as nests or false crawls.

It is worth noticing that out of five nests detected in 2004, in EM, three were successful, and in 2005, six nests produced two clutches. On this beach there were fewer disturbances than in PA-LB, being reflected in the percentage of success. Besides, in 2004 the beach was less busy, compared to 2005. In PA-LB, there was also an important increase of the number of nests, in 2005, unfortunately, only one nest was successful. The human activities that cause impacts here, are by far more numerous and more intense than in EM.



Shorebirds

The peninsula of Baja California lies along the Pacific Flyway migratory route, which is important for many species of shorebirds that travels from their breeding grounds in northern North America to southern regions from California to South America. The Mexican estate of Baja California Sur, located at the southern half of the peninsula, has a gradient from extensive wetlands of great importance for these migratory birds to small sites that altogether can support an important number of shorebirds during the migratory pass, mainly during the fall migration. These small sites go from freshwater oasis to small seasonal coastal lagoons, such as LB, which is formed by the closure of the mouth that drains a seasonal stream to the ocean. Like most of these habitats along the coast, it is a stopover for many shorebirds. We run two shorebirds censuses, in September 30 and October 10, 2006, to assess the presence of these migratory birds (Table 2).

There are also shorebirds along the entire shoreline; nevertheless, LB is the main feeding and roosting place, and also the more diverse place. Along the beach, the *Calidris* species are the most common birds, compared to other shorebirds here. At difference of sea turtles, the shorebirds are less altered at the present time, mainly because they do not breed here, except for *C. wilsonia*, but any future project related to tourism development associate to the lagoon could permanently destroy this habitat.

SPECIES	September 30	October 10
<i>Himantopus mexicanus</i>	3	1
<i>Charadrius alexandrinus</i>	12	33
<i>Charadrius wilsonia</i>	2	2
<i>Charadrius semipalmatus</i>	11	17
<i>Charadrius vociferus</i>	1	2
<i>Pluvialis squatarola</i>	3	7
<i>Limosa fedoa</i>	19	45
<i>Numenius phaeopus</i>	18	13
<i>Catoptrophorus semipalmatus</i>	14	5
<i>Tringa melanoleuca</i>	2	1
<i>Tringa flavipes</i>	3	0
<i>Heteroscelus incanus</i>	1	1
<i>Actitis macularia</i>	7	9
<i>Limnodromus sp</i>	1	17
<i>Arenaria interpres</i>	2	5
<i>Calidris alba</i>	23	17
<i>Calidris mauri</i>	245	611
<i>Calidris minutilla</i>	34	43
<i>Calidris melanotos</i>	1	3
TOTAL	397	832

Table 2. Shorebirds observed at La Bocana.



There are differences between the spring and autumn migratory patterns, being more important in numbers, as well as, in diversity the autumn migratory pass. The spring migration goes from April to mid May, and apparently the birds pass by, without stopping, or they might take a different route back to their breeding grounds; this situation is probably related to a different pattern of tides, besides most of the coastal lagoons are dry during this time of the year. The fall migration goes from July to November. In the case of *Calidris mauri*, two main migratory passages can be observed, an early one composed by mature females, which is followed by males, and a second peak composed by juveniles (Fernandez 1993). Some birds, stay in the area during the whole winter season. This pattern observed in *C. mauri*, is probably replicated by other species of migratory shorebirds. Of all the species listed in Table 2, only one species, *Charadrius wilsonia*, is a permanent resident and a breeder in the peninsula (Howell & Webb 1995, Hyman et al. 1988).

Coastal Development

There are two major resort projects under development; besides the northern half of PA-LB has been divided by the land owners and has been sold for recreational purposes, lots division starts from the coastline, behind the backshore, inland up to about 1500 m. The development at EM is being done by Bay of Dreams S. de R.L. de C.V., covering 1,728 hectares and will be completed by 2015. It will include 2,611 houses, eight hotels with 1,775 rooms, three eighteen holes golf courses, equestrian center, tennis courts, beach club, man made lagoon, commercial plazas, restaurants, bars, a gastronomic school and an astronomical observatory. Each hotel will have its own desalination plant. The resort at PA is being developed by Punta Arena de la Ventana S. A. de C.V. The details of this project are not known yet, nevertheless, it will be a medium impact development, based mainly on one hotel and recreational houses distributed among the native vegetation. Of course, both projects include roads, swimming pools, planting of exotic vegetation for landscaping and shading purposes, etc. The third development, as already mentioned, is the subdivision of coastal ranching land into lots, and sold by the owners. The purpose here is to develop a low impact residential suburb, but the problem is the lack of planning or regulations about density and characteristics of constructions and the urbanization process. High impacts could come from vegetation removal, road opening, fencing, introduction of exotic species and implementation of services. As the area has a pronounced slope, one of the major concerns is the increase of the erosive process, which will affect the coastal and marine habitats.

Conservation

The heavy traffic caused the destruction of about 95% of the nests, mainly due to the weight of vehicles that compact the sand over the nests, thus killing the eggs, embryos or hatchlings on their way up to the surface or to the water. The vehicle tracks left on the sand could be real barriers for the hatchlings to cross in their way to the ocean. On the other hand, the night traffic is a venue to poaching on nesting females and nests (Bellini 1991). Thus, it is urgent to generate the background information that allows us to demonstrate to the authority the need for management. We think that a proper management could help to recover the population in the near future. It is fundamental to develop an educational program oriented towards all sectors of the community, but mainly to the school children, who are the means to, more effectively, reach the rest of the community (Castihlos & Rocha 1993, Rostan et al. 1997, Shanker et al. 1998, C.C.C. 2002). Any action towards the protection of nests, it will chiefly depend on the involvement of the community (Thomé et al. 1998). This means to generate an



educational program together with the local schools, in particular with children between 9 and 12 years old, which incites the learning, to admire and respect the natural resources and to develop a genuine interest on conservation. On this respect, one of the authors (Karen Ocegüera) is, leading a educational program with the support of SEMARNAT and the participation of school children and adults, to patrol de beach looking for nesting, doing clean-ups on the beach and learning about the aspects of human disturbance that affect the turtles. The response of the community has been very promising, to the point that Karen is planning to set a local NGO, to do conservation of the natural resources with the participation of local people and the support of government and private enterprises.

It will be a priority to raise the interest and the funding to request authorization for setting a breeding corral, where those clutches that are more endangered on the shore could be relocated. These corrals need permanent vigilance and the presence of a biologist as resident, during the whole breeding season. To maintain a corral needs a lot of logistical support and good funding, to assure its continuity as long as required. The corrals are a very effective management tool in areas where, at the present time, the nests left in their natural site have very scanty possibilities of being successful (Shanker et al. 2003). Besides relocating some of the nests in corrals, it is necessary to manage the nests left *in situ*, to assure that they will not be predated by animals or taken by poachers. SEMARNAT requires that over all the nests found be placed a mesh that will prevent the predators from reaching the eggs, but at the same time will allow the hatchlings to get through, in their way to the surface. It is also urgent to manage the population of feral and free raging domestic dogs that wander on the beach, because dogs destroy more nests than coyotes and foxes together. In the case of coyotes and foxes the mesh over the nest will be enough to prevent predation. Signs on the beach and the distribution of flies with information on the natural history of turtles and illegal activities are being implemented during the 2006 season. It will not be possible to evaluate the results of this campaign, before two or three seasons of work. The strengthening of traditions and social relationships in the community, with the establishment of community libraries, festivals and artistic expressions, such as theatre, painting and music will be the best allies of a permanent conservation program (Comin et al. 1997).

An action that could be effective in the short term, but we doubt that it will help in a permanent program of conservation, is the patrolling of the beach by police, marines or army, because it only works when these units are present. As soon as they go away the problem is back on the beach again, since the government normally uses this type of solution for very short periods of time.

The most recent set of impacts are arising from the different forms of tourism: sun and beach, sport fishing, adventure, nature oriented, and the traditional massive tourism. All of them are already present in the area, although still at low scale. There are two kinds of impacts: those provoked by the tourist itself and those that are a consequence of the infrastructure developed. The tourist is easier to control than the local residents, since providing the proper information at arrival they will respect it. A much serious problem is the development of the infrastructure to support this tourism, such as buildings, roads, fences, services, street lights, and all the activities related to it: the traffic, the noise, the illumination towards the ocean, the erosion, changes of landscape, etc. That will irremediably affect the behavior and modify the habitat of sea turtles.



Some of the problems are easy to remedy like correcting the orientation of all lights, but others are much more difficult to deal with, such as the construction on the backshore or just over the shoreline, which only could be corrected by a strong action of the authority. At present, the fencing with barbwires, stone walls and rock piling, on one side, and the paving of walkways and front yards, on the other side, are being an immediate problem that is already very difficult to solve.

In the case of the illumination, the problem is easily solved by covering the lights from the ocean side with a screen which size will depend on the type of light, closing curtains in windows facing the ocean or by turning lights off (Marcheski 1992). In the future, the government should norm on construction standards for coastal areas where turtles come to nest. One of the permanent objectives in our studies is to generate sufficient data to press the government in this direction, and also to support it in their regulatory decisions.

The work with shorebirds just started, nevertheless, the management problems seems to be simpler, compared to sea turtles, mainly, because we are dealing with a migrant population, with few exceptions. Habitat modifications provoked by future human development, such as vegetation removal, erosion, presence of lights, increased traffic, pollutants, noise, etc., could irreversible change the coastal lagoon at LB, thus loosing this important wetland and shorebird feeding and roosting station during their short migratory passage. This type of feeding areas are crucial as stopover stations during their migration, but at the same time are very fragile habitats; once they are modified are usually lost for ever. If the birds are coming from the north after a 3,000 to 4,000 km non stop flight, with all their energy reserves exhausted, will not have the power to reach another feeding station, causing heavy mortality on the migrants.

The conservation of shorebirds could be closely linked to the sea turtles program, since the managing of the beach will also favor the shorebirds. But, when we deal with La Bocana which is a habitat of great importance only to the birds, the proposal is to preserve this wetland as a sanctuary for shorebirds, and the whole ecosystem will be protected.



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MONITORING MARINE RECREATINAL WATER QUALITY IN ANTALYA BAY AND INTERANNUALY CHANGES OF MICROBIAL INDICATORS

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The amount of tourists visiting Antalya is increasing every year because of the tourism activities. In the last years, it is understood that the construction for tourism along the sea shore has increased. This increase causes microbiological pollution in the sea. Microbial pollution generated by these sources can reach the environment mostly uncontrolled. Bacterial contamination in coastal surface waters is a problem affecting recreational and commercial uses of bays, inlets, estuaries, and rivers throughout the Antalya Bay. Water quality degradation from fecal contamination may result in increased health hazards to recreational users. In this work, samples were taken from the coast stations used for bathing sea water of Antalya Bay from 2001 to 2005 generally two weeks' intervals. According to criteria of bathing water analyzed for three indicator bacteria (Total Coliform, Fecal Coliform and Fecal Streptococci) in water samples to facilitate comparison with established bacteriological water-quality criteria. Our aim is to compare the changes of the results and expose the increase in microbiological pollution in sea water Antalya Bay among the years. As a result of these analyses, Coliform bacteria have shown increasing trend for bathing and recreational activities in the Antalya coastline.

Keywords: *Marine Recreational Water Quality, Coliform, Antalya Bay.*

INTRODUCTION

Antalya is located in the east of the Mediterranean region and is an important and noteworthy tourist centre on the Mediterranean Coast with its perfect climate and splendid harmony of archaeological, historical and natural beauties, throughout the year. However the amount of tourists visiting Antalya is increasing every year because of the tourism activities. The coastal region of Antalya Bay has increased in population growth and development in the past twenty years. In the last years, it is seen that the construction for tourism along the sea shore has increased. The Antalya Bay has been 650 kilometers long and it has 1,631,392 million populations. An estimated total 7.2 million tourist and about 3 million domestic tourist visits the public beach of Antalya, annually for a total economic benefit to the state over 5 US billion dollars. This increase causes microbiological pollution in the sea which generated by these sources, that can mostly reach the environment uncontrolled. To protect recreational and bathing seawater quality is monitored an interval fortnightly by the Blue Flag Campaign, and The Municipality of Antalya.



Microbial contamination is a problem affecting recreational uses of the bay, rivers and streams in Antalya. In this region, demographic growth is increasing in the percentage of natural landscapes which has increased run off carrying chemical pollutants and biological agents into coastal waters. A positive correlation between fecal coliform counts and percent impervious surface and watershed population was observed in coastal areas of Antalya Bay [1]. A total of 13 waste water treatment plants (WWTP) are under operation and also 7 WWTPs are still under construction in Antalya. Fecal pollutants of the province are treated in these treatment facilities, however, the control of the pollutants which are carried with the streams are not possible yet. Wildlife, sewage effluents, failing, from septic systems and run off animal feedlots and agricultural lands are important sources of total and fecal coliform in surface water [2], [3]. Several investigators have reported that FC levels vary with seasonal changes in rainfall [4] and river discharge [2], [5], [6].

The goal of this study was to assess the microbiological water quality and to determine levels of fecal indicator bacteria in estuaries with high concentrations, during the tourism season. Additionally the relationship indicator micro-organism and local population were assessed.

Description area

Antalya is situated on a plain which consists of two flat areas formed of falez rock at a height of 35 m, where the mountains recede from the shore. On the first rocky plain on the coast is the town centre. The coast is 640 km length and borders with Esen in the west and Kaledran creek in the east. The province has an area of 20,820 km². The soil of the plain is made up of conglomerate, alluvium and travertine falez rocks.

In Antalya Bay, there are totally 20 rivers and/or streams flowing. These river and streams are situated 4 in Kemer, 5 in Antalya, 2 Serik and 9 rivers and/or streams in Alanya-Manavgat. For this study, 15 of these rivers and/or streams were taken up to analyze. In that area, seawater mixes with water that are coming from flows of sea outfall and river and/or stream, principally the Manavgat, Acisu and Oba Streams that account for approximately >60% of fresh water discharge into the east part of Antalya Bay. However, Aksu and Duden Rivers; Bogacay, Arapsuyu I and Arapsuyu II Streams are contributed significantly to area which is west of Antalya Bay (Figure 1).

Methods

Seawater samples for indicator bacteria analysis were collected from Antalya coastline, amongst April and October months fortnightly from 2001 to 2005 years. Samples were collected and measured at more than 15 stations in the study site. Water samples were collected 30 cm below surface in inverted sterile bottles on the windward side of boat and kept in ice boxes in the dark before filtration. Water samples were taken during the official bathing season. Total (TC) (m-Endo media) and Fecal Coliform (FC) (m-FC medium), and Fecal Streptococci (FS) (Azid medium) determined by membrane filtration technique.

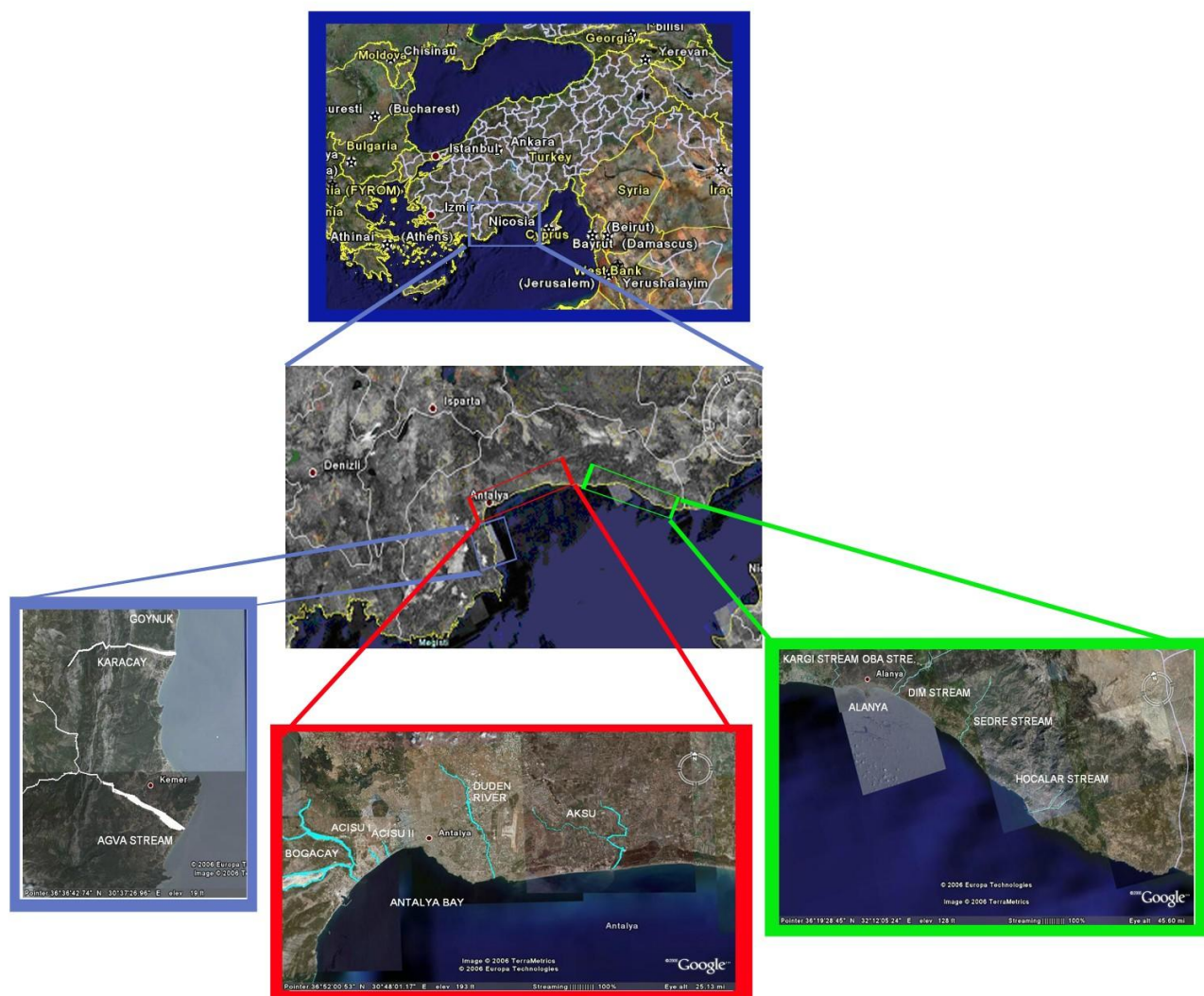


Figure 1 . Map of the Study area in Antalya Bay.

RESULTS AND DISCUSSION

A total 742 samples were collected within estuaries in Antalya Bay, and analyzed for TC, FC and FS and between April and November months, among years of 2001-2005. A summary of indicator bacteria for various years, Total Coliform (TC), Fecal Coliform (FC) and Fecal Streptococci (FS) are presented in Table 3. The mean of TC in Antalya bay ranged 11-347 per 100 ml and the highest amount of TC showed in Aksu and Duden River, and Acisu stream. Fecal Streptococci concentrations varied for FC < 1-440 CFU/ 100 ml in Acisu Stream and for FS < 1-300 CFU/ 100 ml in Arapsuyu Stream (Fig. 2, 3). Greatest mean concentration was recorded in Obacay at 347 CFU/100 ml in 2001.



Indicator microbe	EU Guidelines		Turkey Guidelines	
	Limit values (CFU/100ml)	Accepted %test result higher than limit values	Limit values (CFU/100ml)	Accepted limit values than 2015 year
Total Coli bacteria	500 1000	(%20) (%5)	1000	500
Fecal Coli bacteria (<i>E. coli</i>)	100 2000	(%20) (%5)	200	100
Fecal Enterococci	100	(%10)	100	

Table 1.Guidelines for recreational and bathing seawater in EU and Turkey

Results from fortnightly monitoring show that the mean concentrations of microbial indicators in Antalya Bay were below the guideline levels (Table1), during the five years (Fig,2,3,4). Microbiological data were commented as per the guidelines for recreational and bathing water in European Union and Turkey. The typical indicators in European Union (EU) and Turkey include Total coliform (TC), Fecal coliform (FC), *Escherichia coli* and Fecal Streptococci (FS). The accepted limit values of TC and FC have been regulated by the Bathing Water Quality Standards in Turkey effective by 2015. Accordingly, the modified guideline has been issued which specifies the use of *E. coli* and Enterococci (FS) as the indicator of choice (Official Gazette, 2005).

Location	Years			Population growth rate(%) (2000-2005)
	1999	2000	2005*	
KEMER	23268	55092	63867	37,71
ANTALYA	448773	714129	827871	25,35
SERİK	84755	109360	124214	17,53
MANAVGAT	118897	199385	231142	26,71
ALANYA	129396	257671	298711	31,72

* Estimated populations in 2005.

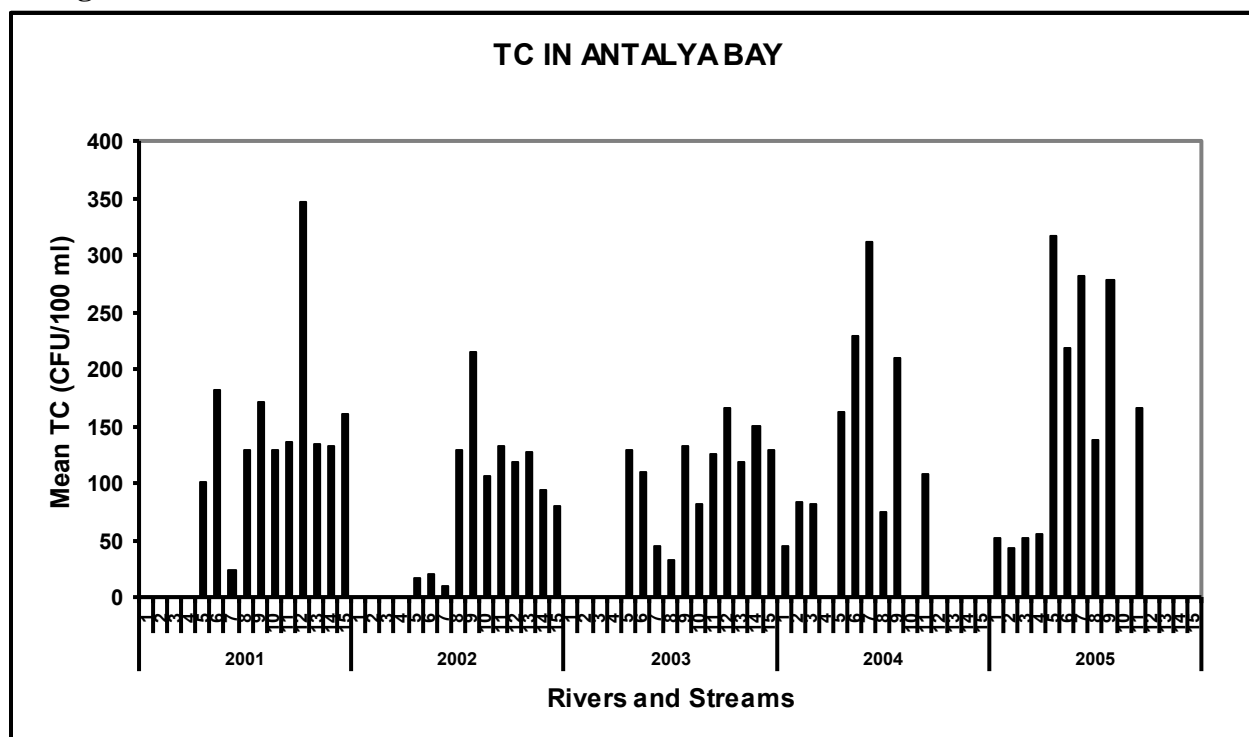
Table 2. Population growth rate between the years 2000-2005 [6]



Antalya is one of the major destinations for immigration in Turkey with an immigrant rate of 90 % between the years 1985 and 1990 [8]. When the population densities considered for Antalya province, Antalya, Alanya and Manavgat are the three major centers with high population densities. Particularly, in tourism seasons, these dense residential centers become overcrowded with visiting domestic and international tourists. In the last 5 years, it has been observed that the fecal streptococcus limit in the stream in Alanya named Oba Cay has been almost reached. Also total coliform amount in two rivers in Alanya and Serik, is approaching the total coliform limit respectively Oba Cay and Acisu. On the other hand, in Antalya and Alanya, average of fecal coliform amount does not exceed the guideline levels but in some definite term of the year guideline levels are exceeded (Table 1). Sometimes in the maximum limits of TC, FC and FS some increases are seen clearly (Fig. 2,3). In addition to that, it is observed that fecal coliform level in Antalya has increased. Düden [1, 5], Arapsuyu, Aksu and Boğaçay [5] carry off microbiologically polluted water to the Antalya Bay.

Boundaries of Antalya province cover a total of 14 counties and 10 of them lies over the coast. When the county population densities are considered with intensive tourism facilities, the domestic populations of the counties considerably increases in tourism seasons. Because of the effects of this dense local population and intensive tourism activities, the fecal pollution of the streams considerably increases with the population increase (Table 2). The counties which lie in the terrestrial regions of the province also have an affect on the marine pollution because of the transport of the fecal pollutants via streams and rivers.

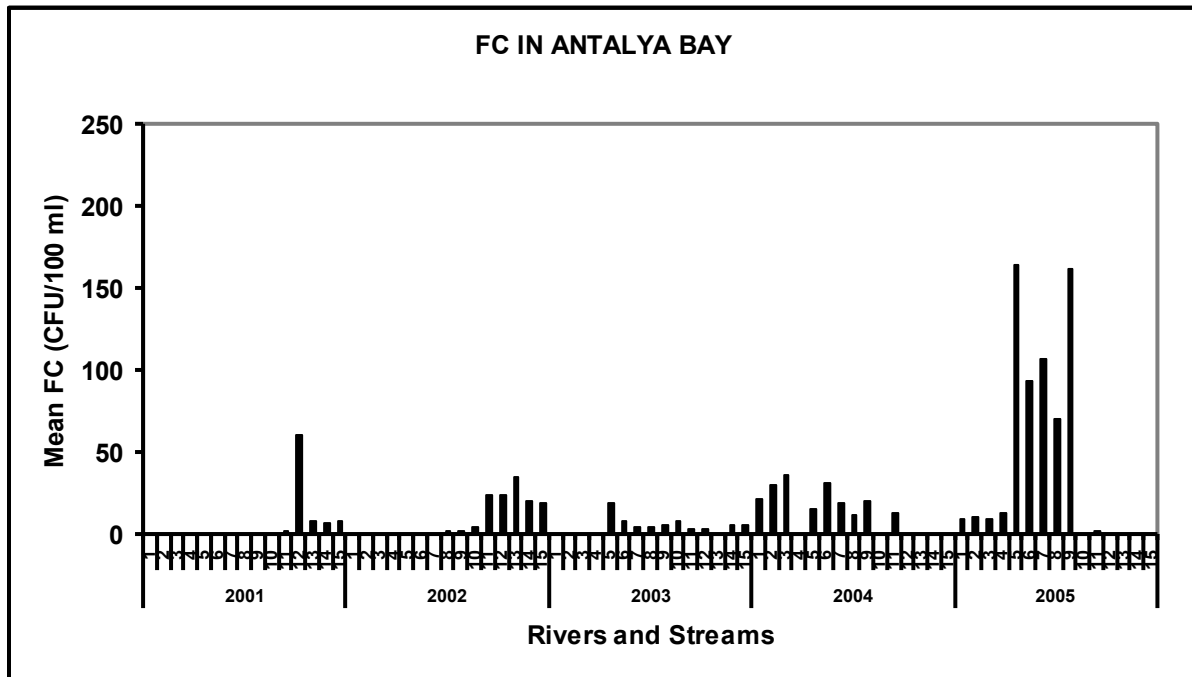
Figure 1



1. Karaçay Stream, 2. Agva Stream, 3. Göynük Stream, 4. Beldibi Stream, 5. Aksu River, 6. Bogacay, 7. Duden river, 8. Arapsuyu Stream, 9. Acisu Stream, 10. Nifrit Stream, 11. Kargı Stream, 12. Oba Stream, 13. Dim Stream, 14. Sedre Stream, 15. Hocalar Stream.

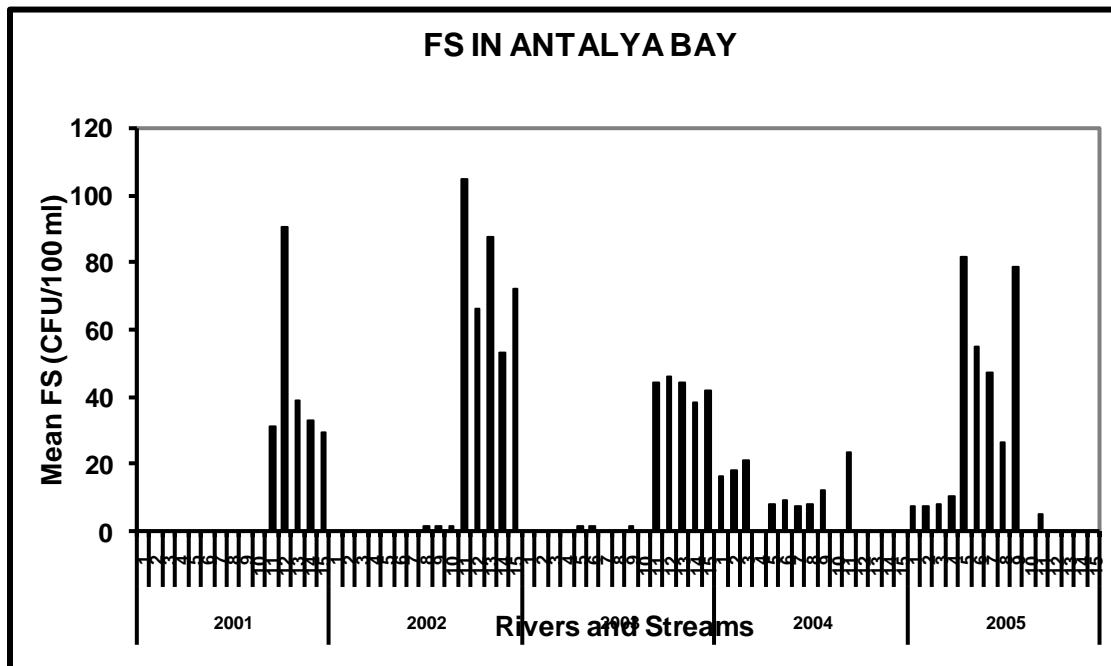


Figure 2 . Inter -annual variations in the mean total coliform levels in Antalya Bay estuaries. Values based on samples collected from April to November.



1. Karaçay Stream, 2. Agva Stream, 3. Göynük Stream, 4. Beldibi Stream, 5. Aksu River, 6. Bogacay, 7. Duden river, 8. Arapsuyu Stream, 9. Acısu Stream, 10. Nifrit Stream, 11. Kargı Stream, 12. Oba Stream, 13. Dim Stream, 14. Sedre Stream, 15. Hocalar Stream.

Figure 3 . Inter -annual variations in the mean fecal coliform and fecal streptococci levels in Antalya Bay estuaries. Values based on samples collected from April to November.



1. Karaçay Stream, 2. Agva Stream, 3. Göynük Stream, 4. Beldibi Stream, 5. Aksu River, 6. Bogacay, 7. Duden river, 8. Arapsuyu Stream, 9. Acısu Stream, 10. Nifrit Stream, 11. Kargı Stream, 12. Oba Stream, 13. Dim Stream, 14. Sedre Stream, 15. Hocalar Stream.



Table 3. Minimum, maximum and average values of the samples taken from the rivers and/or streams during five years

LOCATION	STREAMS	2001			2002			2003			2004			2005		
		TC	FC	FS	TC	FC	FS	TC	FC	FS	TC	FC	FS	TC	FC	FS
KEMER	KARAÇAY	-	-	-	-	-	-	-	-	-	20-90	0-65	0-65	23-75	0-20	0-28
	AGVA	-	-	-	-	-	-	-	-	-	45	22	16	32	10	7
	GOYNUK	-	-	-	-	-	-	-	-	-	43-145	15-73	0-42	0-25	0-25	0-17
	BELDIBI	-	-	-	-	-	-	-	-	-	85	31	18	44	11	7
	BELDIBI	-	-	-	-	-	-	-	-	-	0-181	0-90	0-52	0-93	0-22	0-29
ANTALYA MERKEZ	BOĞAÇAY	9-760	0-0	0-0	0-240	0-0	0-0	14-600	1-38	0-5	12-480	0-120	0-90	2-550	0-270	1-189
	DUDEN	183	0	0	21	0	0	111	8	1	230	32	9	220	94	55
	ARAPSUYU	3-75	0-0	0-0	0-75	0-0	0-0	5-125	0-15	0-2	10-480	0-50	0-40	28-1500	8-400	3-200
	AKSU	25	0	0	11	0	0	45	5	0	312	20	7	282	107	47
	ACISU	9-460	0-0	0-0	0-75	0-0	0-0	33-600	0-95	0-15	14-400	0-58	0-70	4-1060	0-400	1-300
SERIK	NIFRIT	101	0	0	18	0	0	130	20	1	164	16	8	318	165	82
	MANAVGAT	3-880	0-0	0-0	0-1100	0-23	0-9	0-120	0-28	0-3	12-140	0-90	0-80	0-348	0-300	0-90
	KARGI	129	0	0	130	2	1	33	5	0	76	12	8	139	71	26
	OBAÇAYI	9-460	0-0	0-0	0-1100	0-23	0-9	15-700	0-20	0-8	22-750	0-120	0-100	0-816	0-440	0-260
	DİM ÇAYI	172	0	0	215	2	1	133	6	1	210	21	12	279	162	79
ALANYA	SEDRE	9-460	0-0	0-0	0-460	0-23	0-9	6-160	0-20	0-0	-	-	-	-	-	-
	HOCALAR	129	0	0	107	5	1	82	8	0	-	-	-	-	-	-
	ALL STREAMS	10-310	0-20	0-90	20-340	0-240	0-400	10-400	0-20	0-120	10-320	0-60	0-80	0-600	0-30	0-20
	TOTAL	137	2	31	133	25	105	127	4	44	109	13	23	166	3	5
	NUMBER OF SAMPLES	50-680	0-190	0-320	20-400	0-120	0-200	8-380	0-40	0-100	-	-	-	-	-	-
		347	61	91	120	24	66	166	4	46	-	-	-	-	-	-
		10-390	0-30	0-100	20-410	0-260	0-340	20-350	0-0	0-200	-	-	-	-	-	-
		135	8	39	128	35	88	120	0	44	-	-	-	-	-	-
		20-500	0-50	0-140	20-290	0-100	0-280	0-320	0-40	0-170	-	-	-	-	-	-
		134	7	33	94	21	53	151	6	38	-	-	-	-	-	-
		30-330	0-40	0-100	10-260	0-160	0-220	10-300	0-30	0-100	-	-	-	-	-	-
		162	8	29	81	20	72	129	6	42	-	-	-	-	-	-
		153	153	153	170	170	170	154	154	154	135	135	135	150	150	150
		459			510			482			405			450		

CONCLUSION

In Antalya region tourism is a very important source of income. Turkish revenue get its 90 % revenue from its coast. But it brings lots of environmental problems in its train. So these environmental problems must be considered while tourism activities are going on. Because environmental pollution in coast can badly affect the tourism in turn economical and social welfare.

During this study, we used five-year-data of samples to assess indicator microorganism levels in the streams and the rivers flowing to Antalya Bay. FC amount increase was observed noticeably with the increasing tourist population in summer season. On the other hand in rainy seasons (especially in November) TC amount increase was seen because of the rain as well.

ACKNOWLEDGEMENTS

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FUTURE BERTH REQUIREMENTS FOR SUSTAINABILITY OF IZMIR CONTAINER PORT SERVICES

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Queuing modeling is frequently used for optimizing the number of berths in a port. This study is also utilized by this modeling. However, future requirements of berths are also determined. Queue model selection plays an important role in varying the number of berths. Mathematical model is supported by the cost model proposed. Here, the total cost which contains cost of idle berths and cost of ships waiting in queue is minimized. Cost of service at berths, in which loading and unloading operations are maintained, and cost of investment to be applied certain amortization factor are not considered in the scope of study. For future requirements of berths, the forecasts resulting from the macro and micro projection are utilized. Especially, the service time distributions of ships for each year considered are assumed invariable. Mathematical and cost models are applied for designing container berths in Izmir port. It is seen that at least two berths should be designed for each five-year period.

Keywords: *Container port, berth capacity, seaport optimization, port planning, port feasibility, ship traffic*

INTRODUCTION

One of the most important facilities to carry out port functions is the berth to provide for easy approach, maneuvering and the possibility for handling processes. The physical dimensions of berth must be suitable for the ships to arrive at the port. In designing a port, the ship statistics are playing an important role. The length of ship, tonnages, drafts and the spent time for service at berth are the design parameters for both sizing the substructures and management of port. The handling equipment selected to the types of cargo such as container, break-bulk, bulk, ro-ro causes the variation of berth length and service time at berth.

The design of the berth aims to determining the optimum number and length of berths. If the certain design ship length is not determined, their lengths can be designed as different from each other. But the application of this choice is required complex processes. If the average ship length is taken as the design ship length as in this study, the optimum length of berth can be determined by using the queuing theory which is one of the mathematical optimization methods.

Port of Izmir is face to face from both the insufficient urban planning and unexpected increasing of cargo volume and number of ships. Especially in bulk, break-bulk and ro-ro terminals, any congestion and operational problems are not seen, because the cargo volume limited and existing berths used in efficient. The problem appears in container terminal because the most of cargo volume is composed of container cargo. The rising of ship and container traffic exceeding the expected traffic are caused by the realization over the cargo volumes of import, export and domestic trade that were expected in feasibility of port.



The statistics on ship arrival and spent time for service at the berth for each ship at the present day and in past are collected and evaluated. First of all, the time interval of ship arrivals and service time intervals are related to the distributions of probability. Ship arrival and service time distributions are fitted to Poisson and Erlang distributions according to χ^2 test. In selecting the queuing model parameters, infinite arrival source and interarrival independency, parallel channel, first come first served (FCFS), Poisson arrival distribution, and Erlang service time distribution are considered. In optimization process, the aim is to obtain the number of berths correspond to the minimum total cost. This cost is composed of cost of idle ships, cost of unemployed, idle berths and cost of service. While carrying out optimization process on the basis of deterministic and probabilistic methods, these costs are taken into account.

For each projection year, cargo volume and number of ships produced by the macro and micro forecast methods are taken as the main parameters in optimization process. For evaluation of existing situation, the deterministic method representing the existing berths, certain arrival and service rate is used and reasonable results are obtained. For future projection, the types of ship arrival and service time distribution are kept for each year; the new service time distribution to total number of ships known for each projection year is linearly produced. The probabilistic method including the queuing theory provide the required parameters such as the number of ships at queue and in system and their waiting times for each five year period. The total cost is calculated by the waiting time of ships at queue and in system by taking the certain number of berth. Finally, the optimum number of berth correspond to the total minimum cost is found for each five year in long term planning.

MATHEMATICAL MODELLING: QUEUING THEORY

This model is frequently used in determining the optimum number of berths by the way of calculating especially the queue length of ships to wait at queue and queue waiting time of ships. However, for the accurate modeling, the characteristics of queuing model must be well defined. This provides the reliability of model to be used in determining sizes and capacities of port facilities which are costly investments.

Ship queue before approaching the berths occurs when the ship arrival rate is bigger than the ship service rate. While going on loading and unloading service for ships in front of berths, on the other side, the ships which are not able to approach to the berths utilized by other ships are moored outer port. There is no priority between waiting ships and first coming ship generally takes the service first. Therefore, this process causes the queue occurrence among waiting ships for service. Being randomness and constancy in the arrival time intervals of ships to port and their service time intervals during loading and unloading affect directly the ship queue length.



A ship queue can be characterized as depending on some factors. These are ship population (finite or infinite), number of server for ships (single or multiple and series or parallel or mixed), queue discipline (first come-first served FCFS, last come- first served LCFS or priority), arrival time distribution of ships (constant, exponential, or gamma) and service time distribution of ships (constant, exponential or gamma). In this study, ship population is considered *infinite* if the rate arrival source generates the ships is not appreciably affected by the number of ships in the queue system (ships in the queue and those in service). The number of servers assumed as berths is of course taken as *multiple* because more than one server presents service for ships. Ships are selected from the queuing line for service in principle: early coming ship is served early. This means that queue discipline is *FCFS*. Each berth, however, work independently of the others, having its own queuing priority discipline. The probability of service time distribution known as the distribution of the time intervals keeping on from the commencement to the completion of service is specified. In this study, the berth service pattern verifies the *simple negative exponential* curve sufficiently. In general, the arrivals of ships into a port are randomly distributed. Probability distribution of number of ships arriving in a port during a specified port operation time generally fits to Poisson distribution. Others than this distribution may be also utilized. In this situation, the most proper distribution function must be found by using the Chi-square test of goodness of fit. In this study, the Poisson arrival time distribution and negative exponential (or Erlang distribution $K=1$) service time distribution are tested and the sufficiently fitness of these functions are verified.

The model utilized in this study is defined as $(M/M/c):(GD/\infty/\infty)$ by Kendall notations. M , c , GD , and ∞ are coded respectively as Poisson arrival time or exponential service time distribution, multiple server, FCFS queue discipline and infinite for maximum number allowed in system and size of ship population.

For this model, the queuing system based on the steady-state condition the probability distribution of number of ships in queuing system remains same over time. Mean arrival rate of new ships and mean service rate when n ship are in system are assumed constant because the most systems are normally designed to stay in operation for along while. The queuing theory concentrates widely on the analysis of queue system under the steady-state condition. The following basic parameters of queuing theory are commonly used: steady-state (time independent) probability that exactly n ships are in queuing system, both in waiting and in service (P_n), number of parallel berths or servers (c), the number of arrivals at unit time (n), mean ship arrival rate (λ) and mean ship service rate (μ). When the c number of servers presents a service for the n number of ships, the queue does not happen for $n \leq c$, on the contrary, appear for $n > c$. The following conditions must be however satisfied for the situation of queue occurrence:

$$\frac{\lambda}{c\mu} < 1 \quad \text{or} \quad \frac{\lambda}{\mu} < c$$



Here, the ratio, λ/μ , is called the utilization factor (ρ). For the multichannel queuing problem revealed for three different situations: $n=0$, $1 \leq n < c$ and $n \geq c$, the following governing equations of queue system under steady-state condition are stated by transforming three differential equations expressed under transient condition:

$$\begin{aligned} -\lambda P_{(0)} + \mu P_{(1)} &= 0 & n=0 \\ \lambda P_{(n-1)} - (\lambda + n\mu)P_{(n)} + (n+1)\mu P_{(n+1)} &= 0 & 1 \leq n < c \\ \lambda P_{(n-1)} - (\lambda + c\mu)P_{(n)} + c\mu P_{(n+1)} &= 0 & n \geq c \end{aligned}$$

Hence, the steady-state probability is obtained in the form of

$$P_{(n)} = \frac{(\lambda/\mu)^n}{n!} P_{(0)} = \rho^n \frac{P_{(0)}}{n!} \quad 0 \leq n \leq c$$

$$P_{(n)} = \frac{(\lambda/\mu)^n}{c!c^{n-1}} P_{(0)} = \rho^n \frac{P_{(0)}}{c!c^{n-1}} \quad n \geq c$$

In these two equations, probability of 0 unit in the system P_0 is then derived as follows:

$$P_{(0)} = \frac{1}{\sum_{n=0}^{c-1} \frac{1}{n!} (\lambda/\mu)^n + \left[\frac{1}{c!} (\lambda/\mu)^c \frac{c\mu}{c\mu - \lambda} \right]} = \frac{1}{\sum_{n=0}^{c-1} \frac{1}{n!} \rho^n + \frac{\rho^c}{c!(1 - \rho/c)}}$$

This analytical approach to queuing problem has been used in a variety of situations. [6]

By analyzing the queuing theory, the basic measures of performance shall be determined. These are steady-state probability of n ships in system P_n , expected number of ships in system L and in queue L_q , expected waiting time in system W and in queue W_q . In analysis of queuing system, the following expressions are utilized:

Waiting probability of ships arriving for $n \geq c$,

$$\begin{aligned} P_{(n \geq c)} &= \sum_{n=c}^{\infty} P_n \\ P_n &= (\lambda/\mu)^c \frac{\mu}{(c-1)!(c\mu - \lambda)} P_0 \quad \text{or} \quad P_n = \frac{1}{c!} (\lambda/\mu)^c \frac{c\mu}{c\mu - \lambda} P_0 \end{aligned}$$

Expected number of ships in queue and in system:

$$L_q = \frac{\lambda\mu(\lambda/\mu)^c}{(c-1)!(c\mu - \lambda)^2} P_0 \quad \text{and} \quad L = \frac{\lambda\mu(\lambda/\mu)^c}{(c-1)!(c\mu - \lambda)^2} P_0 + \lambda/\mu = L_q + \rho$$



Expected waiting time in queue and system:

$$W_q = \frac{\mu(\lambda/\mu)^c}{(c-1)!(c\mu-\lambda)^2} P_0 = L_q / \lambda \quad \text{and} \quad W = \frac{\mu(\lambda/\mu)^c}{(c-1)!(c\mu-\lambda)^2} P_0 + 1/\mu = W_q + 1/\mu$$

The mentioned queuing parameters yield mathematical outputs of characterized queue model. These parameters are not enough to make a decision about optimum solution. The other parameters needed for optimization study shall be ensured by cost analysis.

COST MODELLING

The various cost models can be design to optimize the number of berths. One of them is to determine the level of service (either the service rate of the number of servers) that balances between cost of offering the service and cost resulting from delay in offering the service. The objective of other cost model is also to minimize the sum of cost of idle berths with cost resulting from delay in offering the service. In this study, second cost model is taken into consideration. In this case, the balance between the numbers of berths and ships waiting in queue shall be economically and mathematically satisfied. For this purpose, if $n > c$, the ships have to wait in queue to offer the service so that the cost resulting from delay in offering the service shall apper. The amount of cost may be as much as the daily profit of any ship waiting for service. On the contrary, if $n \leq c$, the $n-c$ number of berths are empty so that the cost of idle berths shall be expended. The aim of this study is to get the optimum number of berths, S_{opt} , corresponding to the minimum total cost of these two costs, CT_{min} .

For this purpose, the following total cost (CT) is found by summing the cost of idle berths (Cb) and cost of ships waiting in queue (Cs).

$$CT = Cb + Cs$$

$$Cb = c_b \sum_{n=0}^{S-1} (S-n)F \quad S-n \geq 1$$

$$Cs = c_s \sum_{n=S+1}^n (n-S)F \quad n-S \geq 1$$

Here, S ; the considered number of berths, F ; expected number of days that n ships are arrived, c_s ; daily cost of a ship waiting because of delay in offering the service and c_b ; cost of idle berths, resulting from the daily amortization cost of the investment cost, because some berths are not utilized by ships.



In case of being the optimum number of berths (S), the total costs for the $S+1$ and $S-1$ number of berths has to satisfy the following form;

$$CT_{(s)} < CT_{(s+1)} \text{ and } CT_{(s)} < CT_{(s-1)}$$

By considering period of the study, T , C_s can be written as follows:

$$C_s = (c_s)(T)(L_q)$$

where L_q is calculated from the queuing theory.

ANALYSIS OF IZMIR PORT DATA ON CONTAINER CARGO

The container cargo statistics on 2000 and 2001 years are analyzed by using the mathematical and cost modeling dealt with. The analyses yielded useful decision making results pertaining to the amount of expected delay, probabilities of delay, and the optimum number of berths required to maintain the specified service criteria and the optimum berth utilization ratio.

The arrivals of ships to the port are assumed as infinite and random. According to these assumptions, daily arrivals of ships to Izmir port during 2000 and 2001 are presented as the following table.

The prerequisite of the proposed mathematical model is to find out whether the Poisson distribution could adequately represent the observed ship arrival data. The χ^2 test of goodness of fit may be used to see if the observed ship arrivals for Izmir port conform to Poisson distribution. This test is made in Table.2.

Observed ship arrival distribution

$$P_n' = t/T$$

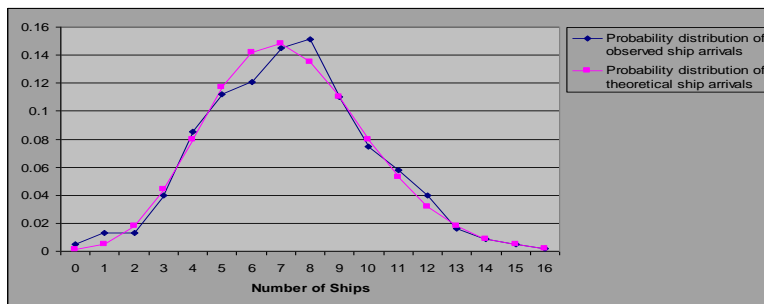
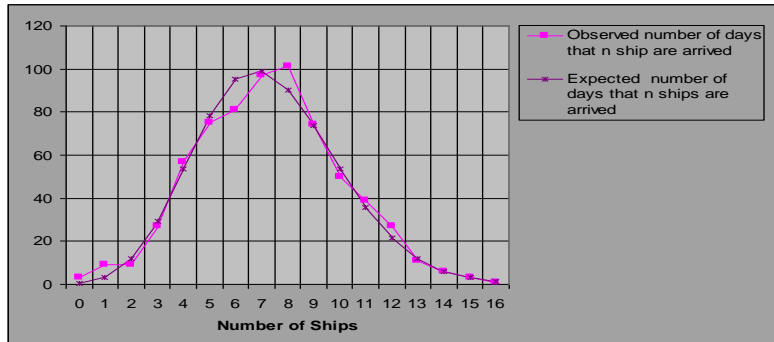
Theoretical ship arrival distribution

$$P_n' = \frac{\left(\bar{n}\right)^n e^{-\bar{n}}}{n!} \quad \text{for} \quad \left(\bar{n} = N/T = 7.30\right)$$



n	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	Total
0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	3
1	2	0	0	1	0	1	1	0	0	1	0	2	0	0	0	0	0	0	0	1	0	0	9
2	1	0	0	1	1	0	0	0	0	0	0	1	0	0	2	1	0	0	0	1	0	1	9
3	1	2	2	1	2	0	2	2	0	0	0	1	5	0	0	1	0	2	0	0	1	5	27
4	1	3	1	0	2	3	3	1	2	2	2	3	3	3	3	3	4	3	8	1	4	2	57
5	2	2	2	7	2	4	3	3	3	2	3	4	4	7	4	5	4	2	1	4	5	2	75
6	4	4	4	2	5	5	2	6	6	3	2	1	3	3	5	3	6	4	2	3	4	4	81
7	5	5	3	5	3	4	5	4	5	3	3	4	4	6	4	4	4	6	4	10	3	3	97
8	4	4	4	5	4	6	4	4	8	5	2	4	5	5	7	6	3	8	3	5	3	1	100
9	4	5	5	2	3	3	5	6	1	6	5	3	3	2	1	2	4	2	3	2	4	4	75
10	3	2	2	3	2	2	3	0	4	3	4	3	0	1	2	1	1	1	6	3	2	2	50
11	2	0	1	2	3	1	1	1	0	1	5	4	1	1	2	3	2	0	2	1	2	4	39
12	0	0	4	0	3	0	1	2	0	2	2	0	2	0	0	1	3	2	2	0	1	2	27
13	0	2	1	1	0	1	1	0	0	2	2	1	0	0	0	0	0	0	0	0	0	0	11
14	0	0	0	0	1	0	0	2	0	1	0	0	1	0	0	0	0	0	0	0	0	1	6
15	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3
16	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Table.1 Daily Ship Arrivals for 2000 and 2001 years (for N=4892 ships, T=670 days)

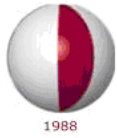


Number of Ships arriving in the same day <i>n</i>	<i>Chi- square test</i> <i>d.f.=14</i> $X^2=(O-E)^2/E$ χ^2
0	8.10
1	9.53
2	0.78
3	0.21
4	0.22
5	0.15
6	2.10
7	0.05
8	1.23
9	0.00
10	0.24
11	0.34
12	1.44
13	0.09
14	
15	0.05
16	
4892	24.52

Table.2 Chi-square test of observed ship arrival distribution compared by its theoretical distribution “Poisson Distribution” for 2000 and 2001 years

In Table.2, since $\chi^2_{\text{calculated}} = 24.52 < \chi^2_{0.01,14} = 29.10$ so the data can be accepted as adequately fitted by Poisson distribution with parameter 7.3 ship arrivals per day. However, it is seen that there is a goodness of fit of more than 99 percent.

Ship service times spent at berths Izmir port working the rule of queuing discipline in accordance with single queuing line and first come–first served has to be also analyzed. Table.3 shows the confidence level of the observed and expected (by Erlangian probability distribution $K=1$) service times. In this table, because of $\chi^2_{\text{calculated}} = 27.69 < \chi^2_{0.05,17} = 27.60$, the goodness of fit is adequately satisfied. Therefore, the Erlang distribution $K=1$ (negative exponential distribution) is used preferably for the actual service time distribution.



Berth Service Time in hour " t_b "	Number of ships at berths " n "	Cumulative Distribution of observed ships in percent, " O "	Total service times spent at berths in hour Observed T_b	Cumulative Dist. expected total service times spent at berths in hour, Erlang T_b ', " E "	Chi-Sq Test d.f.=17 $X^2 (O-E)^2/E$
0 – 14.99	2035	100.0	15252	75.76	7.75
15 – 29.99	1379	58.4	31021	43.50	5.11
30 – 44.99	686	30.2	25722	24.97	1.09
45 – 59.99	364	16.2	19108	14.33	0.24
60 – 74.99	166	8.7	11204	8.23	2.70
75 – 89.99	95	5.4	7837	4.72	9.67
90 – 104.99	58	3.4	5655	2.71	0.17
105 – 119.99	32	2.2	3600	5.56	0.26
120 – 134.99	24	1.6	3060	0.89	0.56
135 – 149.99	11	1.1	1567	0.51	0.67
150 – 164.99	9	0.9	1417	0.29	1.24
165 – 179.99	9	0.7	1552	0.17	1.67
180 – 194.99	5	0.5	937	9.71	1.67
195 – 209.99	6	0.4	1215	0.06	2.13
210 – 224.99	5	0.3	1087	3.20	2.25
225 – 239.99	3	0.2	697	1.84	1.80
240 – 254.99	3	0.1	742	1.05	0.76
255 – 270	2	0.04	525	6.05	0.19
Total	4892		132198		27.69

Table.3 Time spent at berth compared Erlangian distribution for $K=1$ according to the statistics on 2000 and 2001 years in Izmir Port ($b=0.037$ ship/hour)

According to the mathematical model developed, the queuing design parameters are calculated and presented as in Table.4.

c	10	11	12	13	14	15	16
L_q	2.1244	0.8286	0.3446	0.1555	0.0679	0.0291	0.0121
L_s	10.3444	9.0486	8.5746	8.3755	8.2879	8.2491	8.2321
W_q	6.9882	2.7257	1.1664	0.5115	0.2234	0.0957	0.0398
W_s	34.0152	29.7527	28.1935	27.5385	27.2504	27.1228	27.0668
L_x	1192	1862	2532	3202	3872	4542	5212
$P_0 (10-4)$	2.1098	2.4420	2.5852	2.6471	2.6735	2.6846	2.6892

Table.4 Queuing design parameters for various numbers of berths



Here, L_x is the total number of idle berths used as the total expected number of days for $n-S \geq l$. These parameters are utilized for the cost model. The total cost of both cost of idle berths depending on the amortization factors and cost of ships waiting in the queue are obtained for cost minimization study (as seen in Table.5). The unit costs such as c_s ; daily cost of a ship waiting because of delay in offering the service and c_b ; cost of idle berths are respectively taken as 5 000 USD and 1 000 USD.

c	10	11	12	13	14	15	16
C_s	71167 40	2775810	1154410	520925	227465	97485	40535
C_b	11921 17	1862117	2532117	3202117	3872117	4542117	5212118
C T	8 308 857	4 637 927	3 686 527	3 723 042	4 099 582	4 639 602	5 252 654

Table.5 Cost of ships waiting, cost of idle berths and total cost

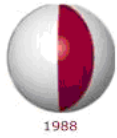
After analyzing the mentioned costs, the minimum total cost corresponds to the optimum number of berths ($S=12$).

In order to determine future berth requirements of Izmir port, the needed annual number of ships is forecasted by using the macro and micro projection results. Table.6 shows the results of container forecasting.

Years	2005	2010	2015	2020	2025	2030	2035	2040
No of ships	3320	3843	4393	4982	5635	6384	7282	8409

Table.6 Results of macro-micro projection of Izmir port

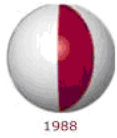
However, the service time distribution is assumed that the cumulative actual distribution of service times in percent is taken same for the service time distributions to be used in determining the future berth requirements of Izmir port in 2005, 2010 and 2015 years (Table.7)



Berth service times in hour	Number of ship at berth, n	Cumulative distribution in percent, %	2005 Total service time at berth, T_b	2010 Total service time at berth, T_b	2015 Total service time at berth, T_b
0 – 14.9	1381	100	10351	11985	13693
15 – 29.9	936	58.4	21055	24385	27871
30 – 44.9	465	30.2	17435	20172	23059
45 – 59.9	249	16.2	13071	15119	17271
60 – 74.9	110	8.7	7424	8572	9787
75 – 89.9	66	5.4	5445	6352	7342
90–104.9	40	3.4	3900	4387	5167
105–119.9	20	2.2	2250	2587	2925
120–134.9	17	1.6	2167	2422	2805
135–149.9	7	1.1	997	1140	1282
150–164.9	7	0.9	1102	1260	1417
165–179.9	7	0.7	1207	1380	1552
180–194.9	3	0.5	562	750	750
195–209.9	3	0.4	607	810	810
210–224.9	3	0.3	652	870	870
225–239.9	3	0.2	697	930	930
240–254.9	2	0.1	495	495	742
255 – 270	1	0.04	263	263	525
Total			89680	103879	118798

Table.7 Service time distributions of Izmir Port for 2005, 2010 and 2015

From Table.7, it is possible to obtain the total service times spent at berths by ships for the future. The optimum number of berths required for future extension of Izmir port is calculated by following same procedures as it is seen in existing port situation. The results of cost analysis are presented in Table 8.



CONCLUSION

Mathematical and economical model of optimization study are based on queuing theory, and cost of idle berths and waiting ships. The queuing model is defined as $(M/M/c):(GD/\infty/\infty)$ representing Poisson arrival time or exponential service time distribution, multiple server, FCFS queue discipline and infinite for maximum number allowed in system and size of ship population. The cost model is considered by minimizing the cost of idle berths and ships waiting in the queue. From the queuing theory, the number of idle berths and ships waiting in queue are calculated.

The model is utilized in determining the optimum number of container berths of Izmir port. When unit costs of idle berths and ships waiting are taken respectively as 1000 USD and 5000 USD, the optimum number of berths is determined as 15 for 2005, 17 for 2010 and 19 for 2015. This means that at least two additional berths should be constructed for each five-year planning term in future planning of Izmir container port.

2005	C	13	14	15	16	17
	C _s	4 035 714	1 837 257	865 231	409 230	191 425
	C _b	1 847 027	2 517 027	3 187 027	3 857 027	4 527 027
	C _T	5 882 741	4 354 284	4 052 258	4 266 257	4 718 452
2010	C	15	16	17	18	19
	C _s	3 791 345	1 828 436	904 055	447 995	219 730
	C _b	2 100 540	2 770 540	3 440 540	4 110 540	4 780 540
	C _T	5 891 885	4 598 977	4 344 596	4 558 536	5 000 271
2015	C	17	18	19	20	21
	C _s	3 719 004	1 877 775	967 079	498 729	254 833
	C _b	2 317 838	2 987 838	3 657 838	4 327 837	4 997 837
	C _T	6 036 842	4 865 613	4 624 918	4 826 566	5 252 670

Table.8 Findings of cost analysis for future extension of Izmir Port to 2005, 2010 and 2015 years.

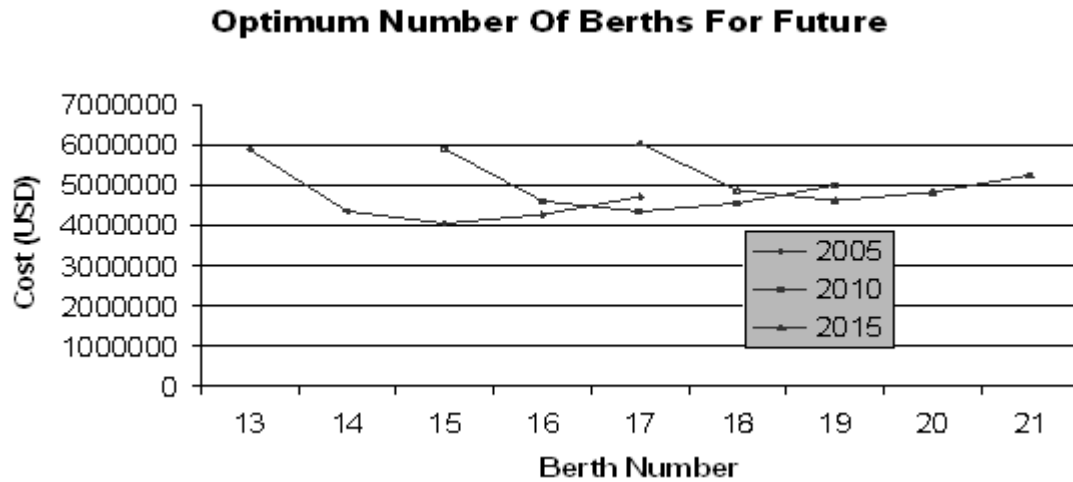


Figure.1 Curves on optimum number of berths and minimum total cost for future

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SOLID WASTE MANAGEMENT AFTER OCTOBER 2005 EARTHQUAKE IN PAKISTAN

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This paper discusses the issues related to Solid Waste Management in the areas affected by the devastating earthquake in Pakistan in October 2005. The paper mainly focuses on the household solid waste.

The earthquake that hit the Northern Pakistan in October 2005 was indeed one of the worst in the world's history. The total area struck by the earthquake was around 44,000 square kilometers with hundreds of villages only accessed after 2 months of the earthquake. Population loss was estimated to be about 79,000 persons with hundreds of thousands displaced and losing the livelihoods.

Just after the earthquake national and international aid flooded in to the area. Realistically, the first preference under such circumstances is always to save human life and then concern for other issues. Environment is already a very low preference in Pakistan and under such conditions no one could have expected that it would be cared.

The areas affected by the earthquake were remote mountainous ranges with few small cities and mainly towns and villages. The simple living style in the towns and villages was traditional and as a result not much amount of solid waste was being produced before the earthquake. The type of waste produced was also mainly organic that was used as fertiliser or feed for animals. However with aid coming from all corners of the globe, the basic structure of the waste entirely changed. Millions of plastic water bottles reached the area along with the packed food. This produced a different type of waste i.e. recyclables in the area. These recyclables don't go away in nature and they need special care. Although with time, the inflow of these recyclables to area decreased but nature was put under great strain by leaving these recyclables in the area along with some permanent changes in consumption behaviour of people also.

Tonnes of plastic recyclables reached the area but not a single NGO or governmental authority was quick enough to put a recyclables collection and transport system from the area. Author was among the few people advocating for this type of action to protect nature as well as provide income generation activities to the earthquake affected people. Such a system with hiring of earthquake-affected persons from area could have been of great help. However most of the stakeholders including international donors mainly focused on the demolition waste and unfortunately some of them were only trying to sell their crushing machinery!

Key words :*Earthquake, Solid Waste, Recyclables, Livelihood, NGO, International Donors*



General Humanitarian Situation

The shallow earthquake, about 10 km deep, occurred at 8.50 am on 8th October 2005 and lasted an unusual 6 minutes and 8 seconds. Tremors of intensity of 6 are rated as major earthquakes. This very severe one measured as 7.6 on the Richter scale and proved to be terribly destructive. The epicentre laid some 95 km northeast of Islamabad (the capital city of the country) in Kashmir, very close to Muzzafarabad, the capital of Pakistani-administered Kashmir. The mainly affected areas were those on Sediment-filled valley floors as well as steep hillsides. As it often rains during this season, the potential for landslides, mud slides, and rock fall was also considerable, causing a further blow to the weak infrastructure of an impoverished region. This earthquake was followed by some 40 aftershocks with intensity of 5 to 6 registered on the seismographs within six hours. Since then, more than 1500 aftershocks kept causing panic, fear and further damage, although minor. Earthquakes may still occur in some areas during the following months.

It is estimated that 3-5 million people have been hit adversely by the earthquakes in Azad Kashmir and NWFP. Severe to total damage occurred to about 50% to 90% houses in the affected areas. Death toll due to the devastating earthquake has rose to 79,000 (official figure) to close to 150,000 (un-official figure) and Millions homeless and hundreds of thousands death threatened. The delivery of humanitarian assistance was constricted by the mountainous area, cold weather, and damaged or collapsed infrastructure. The most affected areas were Pakistani-administered Kashmir, and the North West Frontier Province (NWFP) in Pakistan.

Solid Waste Anatomy before the Earthquake

The region was mountainous with remote habitation of people. The earthquake hit area had 3 major cities while all the remaining were only small towns and villages. The people of these areas were living in a closed system with agriculture as main source of income. In Kashmir part another major source for the families was the income coming from relatives working outside the country. Being in isolated and closed system the following was a typical solid waste preview produced in these areas when considered as average for the whole affected region:

- a. Organic waste including animal waste: 80%
- b. Recyclables: 10%
- c. Non-separable waste: 10%

The largest part of the total waste was organic including the animal waste. Being involved in agricultural activities most of the households were practicing husbandry also as an activity. Animals were kept along the residential block and were fed by grass and also food waste. The organic waste excluding animal waste was mainly vegetables and fruit wastes with very small part of cooked food waste uncommon to the practice in most of the cities in Pakistan where the cooked food waste makes a considerable part of waste. The low temperatures in these areas allowed people to store the extra food for next meal.



Recyclables constituted a very small part of the total waste (not more than 10%). The recyclables in the country have major part of tetra packs of milk and juices followed by paper. In these areas milk was produced at household level and juice was not a major concern with huge number of fruit trees. Water bottles which are now making another significant part of recyclable waste in the country were alien to these areas. People used to drink from natural springs.

Non-separable waste was the waste with dirt, cloth, and bones which may stick together due to mud. In this case also the bones were then picked up by dogs and consumed.

Waste Management System before the Earthquake

The cities had a waste collection system operated by the municipalities. It was not door-to-door collection but rather transport of waste from secondary collection points to the disposal sites. Due to difficult terrain compact trucks were not used for such a transport but rather open tractor trolleys were used to pick the waste accumulated on road sides and taken out of the city. As far as disposal was concerned it was either wild dumping or burning outside the city. None of these cities had proper landfill for waste dumping. Medical waste was generally incinerated in locally developed kilns.

In small towns and villages the waste was not collected by any authority. The waste produced by scattered producers was either burnt by producers or used as feed for animals. In most of cases the second option was valid.

The recyclables part in cities' waste was recovered partially from the wild dump. There was no organised system in any of these cities or towns by municipalities or private sector to either collect the recyclables separately from source or at any recycling centre. The informal sector busy doing such a job at wild dump was made of children of refugees. Major part of this portion of waste consisting of tetra packs of empty juice and packs of tea. Empty milk packs were still something uncommon due to extensive husbandry activity in the region.

In towns and villages the recyclable part was negligible and it was also mainly paper. The paper was also used to burn fire or place inside houses for different uses. The only considerable recyclables were tin of oil can which was again reused to cover roof or to make rain water collection system. However with increasing population there were signs of increasing amounts of these recyclables in the area

Scenario after the Earthquake

After the earthquake there was a huge population flux from scattered areas to cities (most of them destroyed) to camps. There were two types of effects of the earthquake on the solid waste being generated.



Scattered villages and communities who chose not to leave their places starts receiving aid generally packed in recyclables. The largest part was water bottles as the water resources got damaged and even displaced; the most important need was met by sending the bottled water. These bottles were basic need but they piled up in the region. The nature is unable to handle these recyclables by her and especially when this waste is in large quantity. One can see the plastic bottles, biscuit packs, and polythene bags scattered in the once lush green forests of the area. This waste may stay there for a long time but with rains most of it may flow down to near by rivers and thus pollute another part of the ecosystem.

In the camps established for refugees the situation was not that promising either. The city governments were already not in position to handle previously existing waste with the earthquake destroying the infrastructure and influx of new refugees the problem further increased. Again the recyclables were major part of the total waste but this time other organic waste as well as human excreta also made a substantial part of the total amount. Densely populated camps got flooded with heaps of waste thus not only produced a stagnant smell in the area but also risked the pollution of under ground water. In some cases burning was practiced but it produced air pollution and was also not efficient due to cold and rainy weather.

After a year when these areas were visited the piles of plastic material were seen in the forests and also along some secondary and tertiary road links. Similar to approach of a year ago still no authority was planning to collect these recyclables and on real grounds it was now impossible. The waste has been scattered in a very large area and only community work can help to collect it. Unfortunately community seemed to be busy with its reconstruction work and to large extent careless about the issue.

Change in Long-term Consumption behaviour

Through various meetings with local suppliers and people in the area it was known that the demand for materials with recyclable packing increased 5 folds. Again the main part of this was bottled water. In some cases there was genuine need due to dislocation of water resources but in more than 75% of cases the consumer behaviour was found to be changed. People were now more interested in getting packed material that is easy to handle and use. Just to mention a sweet dish made of rice was prepared at homes utilizing available material at homes but now the use of commercially available prepared materials has increased. These small diversions from conventional way of life seem too small to worry but with time they are putting up piles of waste in the areas.



Role of Stakeholders

In general the producer of waste is considered as most important stakeholder. However under such emergency situation this was not true and should not be expected either. People were not only too much worried about their situation but were also not experienced in handling such type and amounts of waste. It should have been the supplier or donor organizations those must also plan to take care of waste especially related to material they were bringing in. This was easily manageable at refugee camps and much more difficult in scattered areas.

It was observed that donor organizations were not very much caring about this issue. However if one classifies between national and foreign organizations then the foreign organizations were more careful than their local counterparts. Turkish NGOs were leading the way with putting up the whole waste collection system in their camps, schools, hospitals as well as even at the places where they distributed any aid material.

Waste collection was one part of the problem while its disposal was another. Due to destroyed municipal infrastructure (municipalities in that area already had not very good system) the proper disposal was not an easy task. The most viable option was dumping and even burning of non-hazardous waste.

Under such circumstances proper waste transportation to a dump site and its burial was not an easy task but in practical it was not difficult either. With a lot and lot of national NGOs and international organizations in the area bringing in of equipment was also not a difficult option. UNICEF arranged a 2-days workshop about handling of earthquake waste but it was very unfortunate to see that their international experts were just trying to propose small crushers to crush the demolishing waste. Demolishing waste was a critical problem but due to low temperature, less winds and few showers and snow fall it was not to be a hazard. Again it is unfortunate to say that those experts were just promoting 2 multinational producers of crushers.

At one stage the author and some other people had a meeting with some international organizations and proposed that a municipal solid waste collection system should be encouraged. This would not only reduce the waste threat but also provide some livelihood to jobless persons who get involved in the waste collection (mainly of recyclables). There were some positive responses from these organizations but all remained to be moral support only!

Not only waste problem was ignored but also the issue of waste water got neglected especially in the refugee camps. Usually the solid waste was then thrown at such places thus further deteriorating the situation and polluting the under ground water sources. The mixing of waste water and solid waste made it more difficult to handle the waste being more wet and smelling with time.



Conclusion and Recommendations

The areas affected by the earthquake were remote mountainous ranges with few small cities and mainly towns and villages. The simple living style in the towns and villages was traditional and as a result not much amount of solid waste was being produced before the earthquake. The type of waste produced was also mainly organic that was used as fertiliser or feed for animals. However with aid coming from all corners of the globe, the basic structure of the waste entirely changed. Millions of plastic water bottles reached the area along with the packed food. This produced a different type of waste i.e. recyclables in the area. These recyclables don't go away in nature and they need special care. Although with time, the inflow of these recyclables to area decreased but nature was put under great strain by leaving these recyclables in the area along with some permanent changes in consumption behaviour of people also.

Although at time of such devastation no one was expecting the care for garbage or solid waste but unfortunately this issue was neglected. Not only any investment in infrastructure was made but no organization tried to full to inform people about this issue. There were some hygienic awareness programs by some NGOs but none actually helped the people to find way out.

Following are few recommendations made in this regard:

1. The remaining municipal infrastructure after any such disaster should immediately be assessed and strengthened to possible extents.
2. Similarly municipal services expert human resources should be figured out and hired by large organizations to perform the task.
3. People should be informed well about the issue as well as should be equipped to handle the problem.
4. Local youth and other people should be hired and trained to take care of waste in a manner that this becomes their income generating activity.
5. There should be better coordination among all donors and other organizations to take care of waste not only produced by the local population but also due to materials brought in by them.
6. All helping organizations should prefer to bring in material with least possible packaging.



OCEAN POLLUTION AS A RESULT OF OFFSHORE AND ONSHORE PETROLEUM ACTIVITIES IN THE AFRICAN GULF OF GUINEA REGION

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The Gulf of Guinea region is located on the Atlantic side of Africa, the region has a total population of approximately 190million people. The sub region comprises of five different countries and their territorial waters which are as follows: Nigeria, Sao tome & princippe, Equatorial Guinea, Gabon and Cameroon.

The region is blessed with so many types of natural resources ranging from petroleum, Natural gas, Bitumen, Uranium Diamond and Gold to mention but a few.

However the region since the last two decades started attracting the World's attention as a result of the continuous increasing discoveries of new oil fields on both its on shores and off shores. In view of this extra ordinary increasing discoveries of new oil fields in the region, the Gulf of Guinea has become a "Gold rush" to the oil companies and it has so far attracted almost all the top oil firms in the world including; Exxon Mobil, Shell, Total, Texaco, Agip, Chevron, Slumberger, Stat Oil and Conoco Phillips among many other oil giants. In the more recent time even the U.S. Marine Corp have stationed their War Ship in the territorial waters of the Gulf in the name of providing protection to the "Liquid Gold" (Petroleum) underlying the beneath of the region.

OIL ACTIVITIES AND ITS ASSOCIATED PROBLEMS IN THE GULF OF GUINEA

As a result of the geometrically increasing oil activities in the region ranging from Drilling, Gas flaring, Bunkering and Exploration activities, there was increase in the general pollution of the region. For example recent reports released in June, 2005 by the internationally renown nongovernmental organization on environmental pollution the Netherlands based Climate Justice programme and the Nigeria's Environmental Rights Action, Under the aegis of friends of the Earth, had it that the region is ranked top on the world's total flare with Nigeria along accounting for 16 percent of the world's total flare. Another example is the increasing cases of oil spillages leading to the increasing cases of pollution of farmlands, rivers, wells and the environment in general. Apart from all these, what is even becoming more worrisome is that none of all these oil firms operating in the region is able to account on how it disposes its industrial toxic waste generated as a result of its industrial activities within the region.

Geological strata are adversely destroyed by seismographic activities. Sea creatures are destroyed by oil pollution. Means of livelihood of revering dwellers are often threatened by pollution.



THE RELATIONSHIP OF THE OIL FIRMS OPERATING IN THE REGION AND THE INHABITANTS OF THE GULF OF GUINEA

Recent research has indicated that there is no good relationship existing between the oil companies and the inhabitants of this region. As a matter of fact an ordinary inhabitant of this region sees the oil companies as his enemies simply because the oil companies are the main cause of the pollution that lead to the degradation of Lands for farming, the extinction of so many types of sea foods they enjoy in the region prior to the commencement of the petroleum activities in the region, that is not all but what is even becoming more worrisome under this condition is the inhuman act of dumping of unprotected and untreated industrial toxic wastes or the Radioactive waste by the oil companies operating in the region on the lands of the inhabitants. For example in March, 2005 one of the internationally respected oil giant the Anglo-Dutch Shell Petroleum oil company was accused by the Amukpe Community of Sapele Local Government area of Delta State in Nigeria for burying toxic wastes in their lands (Punch Newspapers; 9 June, 2005 P.13).

EMANATING PROBLEMS AS A RESULT OF THE PETROLEUM ACTIVITIES IN THE GULF OF GUINEA REGION

Recent research has indicated that the inhabitants of this region especially those occupying the Islands, the Mangrove Swamp areas, the Niger Delta region and all those living within 20 kilometres range from the Atlantic Ocean, have increasing cases of cancerous Tumours, child respiratory illness, brain disorders, infertility and premature deaths. In addition to the problems of poor productivity in their farmlands, the corrosion of their roofing sheets and the rapid decline in seafood.

POSITION OF THE GOVERNMENT ON THE OIL ACTIVITIES IN THE GULF OF GUINEA REGION

Apart from the government of the federal republic of Nigeria who is single handedly trying to de-pollute (clean) the region through the establishments of several agencies all the remaining other governments in the region until after incessant, adequate and intense pressures from the local communities affected by the pollution in the region, in addition to the pressures from the media and some nongovernmental organizations resulted in the establishment of petroleum development commissions in their countries, but the fact still remains that the ordinary inhabitant in the region has not yet benefited from such schemes, and instead the pollution in the region is increasing much more catastrophically in nature than ever before.



POSITION OF THE NON GOVERNMENTAL ORGANIZATIONS IN THE REGION

Apart from the Nigeria's Environmental Rights Action, the impacts of all the remaining other nongovernmental organizations in the region are not yet felt, but instead many of such organizations enjoy corruption in the name of royalties from the powerful and rich petroleum companies operating in the region.

At the international level apart from the climate justice programme that recently released report on flaring activities in the region, all the other international nongovernmental organizations are not focusing their attention to this part of the world. In view of the situation more is still expected from the nongovernmental organizations in order to help in retarding the increasing pollution in this part of the world.

RECOMMENDATIONS

After identifying how the pollution in the Gulf of Guinea region is increasing in relation to the increasing petroleum activities, I have come up with the following suggestions/recommendations.

1. AFRICAN UNION RESOLUTION

The Organization of the Petroleum Exporting Countries (OPEC) in conjunction with the International Atomic Energy Agency (IAEA) should use their capacity to be able to influence the African Union (AU) to pass a resolution banning the illegal dumping of radioactive waste, Gas flaring and Coastal bunkering in this part of the world.

2. RESEARCH AND INVESTIGATION

The Organization of the Petroleum Exporting Countries, in conjunction with the United Nations Environmental Agency, the International Atomic Energy Agency and with the corporation of the African Union should send team of researchers to come and investigate this trend on petroleum pollution in the Gulf of Guinea region and proffer possible solutions in checking the menace.

3. PUBLIC AWARENESS

- (A) The Organization of Petroleum Exporting Countries, the International Atomic Energy Agency, the African Union, Nongovernmental organizations with the collaboration of the African governments should be organizing and sponsoring conferences, seminars and workshops involving all the stakeholders in the matter in order to educate people and companies on controlling the pollution, from time to time.
- (B) There should be an enlightenment units for public awareness of this ill under the various governments of Africa.
- (C) Laws on pollution should be enacted and imposed stiff penalties on defaulters.
- (D) The Petroleum Development Commissions should be more effective.



ANALYSIS AND CONCLUSION

We sighted the causes of petroleum pollution and its associated problems in the Gulf of Guinea, in relations to the role of the oil companies, the governments and the nongovernmental organizations. Although because of the continuous rediscoveries of new oil fields in the region has continuously attracted more oil companies into the region and also increased the pollution of the region in return, but yet some governments are trying in fighting the menace by establishing the Petroleum Development Commissions and also by allocating lion shares from their annual budgets to the polluted areas, local governments and states or counties.

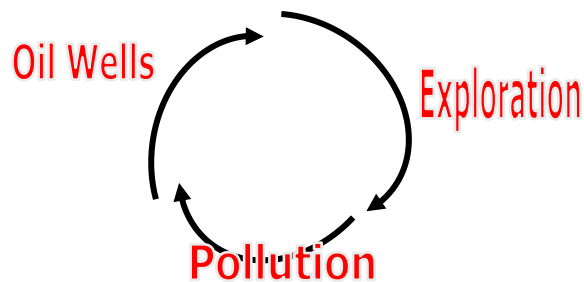
Despite the efforts by the governments in the region towards combating the menace, the increasing cases of cancerous tumours, child respiratory illness, infertility, land degradation, the corrosion of the roofing sheets, premature deaths, river pollution, well pollution and decline in sea food, records still show that the problem of pollution in the region keeps on increasing.

The problem of pollution will ever remain on the increase because of the economic implication of oil exploration in the sub-region.

The exploration activities is now a vicious circle as illustrated below:

Increase in oil wells attributes. — ~~Increase~~ in exploration — ~~Consequent~~ increase in pollution

The vicious circle of the exploration activity





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COASTAL ZONE MANAGEMENT AND VULNERABILITY STUDY OF A SMALL ISLAND STATE - MAURITIUS.

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The limits of the EEZ of Mauritius (1850 km², 20°S, 58°E, South Western Indian Ocean, 1.12 million inhabitants) have been defined by geographical coordinates through subsequent regulations under the Maritime Zones Act 1977 as the Maritime Zones (EEZ) Regulations 1984. Mauritius has proclaimed its Territorial sea (12 nm) through the Territorial Sea Act of 16 April 1970, its Exclusive Economic Zone (200nm, about 1.9 million sq km) and has also defined its continental shelf through the Maritime Zones Act 1977. The banks and shoals of the Mascarene support a very important fishing industry which face problems, including local overfishing, ecosystem degradation and pollution. During the 1980s, the Mauritian economy underwent major structural changes successfully with a rapid phase of industrialization and urbanization with the threat of contamination of surface waters and groundwater in Mauritius and deterioration in water quality by industrial wastes, being only relatively recent as compared to industrialized countries. The mean concentration of Cr, Zn and Pb in sediments along the estuaries on the western coast can be considered below those from contaminated estuarine sediments. The concentration of Zn and Pb were greatest in the more urbanised upper and lower reaches of the St Louis estuary during the period 2000-2005 and were also significantly positively correlated in the estuarine sediments indicating that the cycling of Pb and Zn were linked indicating a common source for Pb and Zn. The potential sources of Pb and Zn in the urban estuarine sediments were considered to arise from road runoff causing significant quantities to be trapped. It is also apparent that lagoon salinity is a function of submarine groundwater discharge (SGD) and appears to be concentrated in specific areas of the lagoons in the east and west of the island and the understanding of the SGD as a pathway for nutrients and its impact on coral reef degradation has been investigated during a UNESCO-IAEA intercomparison experiment in Mauritius in 2005. There is at present a need for long-term studies in estuarine and coastal zone management to involve integrated strategies in which water-sediment interactions and SGD need to be considered and international standards for sediment quality developed. Such studies undertaken in the future would further the understanding of the biogeochemical processes of coastal systems in Mauritius which could then be used in environmental development schemes and effective integrated coastal zone management of tropical islands.



Introduction.

Mauritius is at a critical juncture in its socio-economic evolution. The sustainability of its marine resources and the conservation of its exceptional biological diversity depend on a critical understanding of linkages between human activities and ecological responses. International collaboration that addresses biological and economic dynamics through a series of descriptive, experimental, and modeling studies is vital. No such thing has ever been done before, yet without this type of analysis the concepts of ecological and economic sustainability are intrinsically meaningless. The limits of the EEZ of Mauritius (1850 km², 20°S, 58°E, South Western Indian Ocean, 1.12 million inhabitants) have been defined by geographical coordinates through subsequent regulations under the Maritime Zones Act 1977 as the Maritime Zones (EEZ) Regulations 1984. Mauritius has proclaimed its Territorial sea (12 nm) through the Territorial Sea Act of 16 April 1970, its Exclusive Economic Zone (200nm, about 1.9 million km², Fig. 1) and has also defined its continental shelf through the Maritime Zones Act 1977. At present there is a need for Mauritius to compute the outer limits of the EEZ, produce charts showing baselines and list of geographical coordinates of the basepoints, specifying geodetic datum and submit a claim for an extended continental shelf beyond 200nm to UN Commission on the limits of the Continental Shelf by November 2004. Ferrari (1995) reviewed examples of coastal pollution in the East African region and reported that in most countries of the area there was severe coastal pollution caused by the discharge of sewage and industrial effluents into the sea. In Mauritius, the coastal zone is of critical importance to local subsistence, commercial and recreational activities. Owing to increasing urbanization and industrialization, the coastal zone in Mauritius is being subject to significant conflicts between fishermen, hotel promoters and industries. Linked with population growth and economic development is increasing pressure on the limited land resources from urbanization and industrial development. Increasing and rapid urbanization and industrialization is causing strain on existing infrastructure and services which lead to deteriorating quality of life and environmental problems such as waste management, unplanned and informal settlement, contamination of groundwater and public health issues. The major threat to the marine biodiversity of the Western Indian Ocean is one of unrelenting impoverishment resulting from inorganic and organic pollution, eutrophication and the activities of poor populations dependent on few traditional resources. There is a historical decrease in species diversity stretching westward across the Indian Ocean from the Australasian region (centered on Indonesia), whereas centers of higher endemism characterize the southern African coast and the outlying islands to the south (Mauritius and La Reunion).

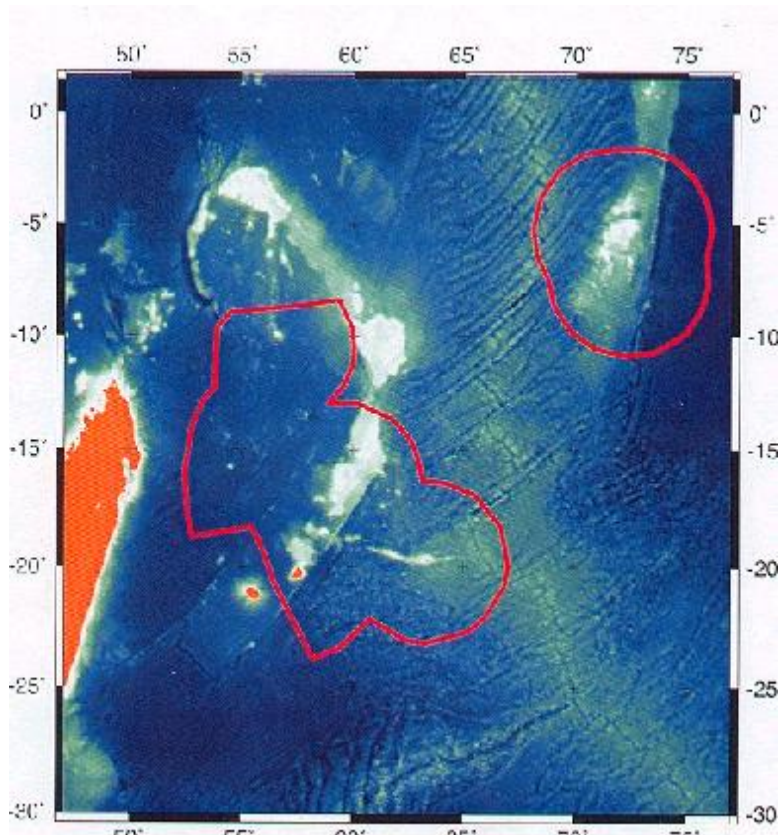


Figure 1. Exclusive Economic Zone around Mauritius.

Integrated Coastal Zone Management in Mauritius.

Galvanized by the United Nations Conference on Environment and Development meeting of 1992, there has been a search for methods to build capacity of coastal nations and communities to manage their coastal and estuarine resources in a sustainable manner. Following ICZM (1993) in Arusha Tanzania, where ministers of the South Western Indian Ocean nations signed a Convention, the Seychelles Statement (1996) and the Sri Lanka CZM workshop (1999), the need for ICZM has become critical because of limited land resources and unproportional domination of coastal areas (Fagoonee and Daby, 1995; Ramessur and Fagoonee, 1999; Ramessur, 2005). During the 1980s, the Mauritian economy underwent major structural changes successfully with a rapid phase of industrialization and urbanization with the threat of contamination of surface waters in Mauritius and deterioration in water quality by industrial wastes, in particular, metal pollution, being only relatively recent as compared to industrialized countries (Ramessur *et al.*, 1998; Ramessur and Ramjeawon, 2002; Ramessur, 2004). The coastal zone of Mauritius was redefined in 1997 in the Environment Protection Act of to include all islets within the EEZ. Mauritius has also ratified and adhered to international law or legal instruments.



The complexity of biotic systems and the interrelatedness of their components require that each coastal water system be managed as a separate system. The coastal areas and waters are the ultimate recipients for environmental degradation and pollution released to the atmosphere, land and water. Mauritius is classed as having a high level of reef-based tourism because over 70% of the total tourists take part in reef-based activities. The number of tourists visiting Mauritius annually has exceeded 750,000 in 2006. Coastal developments have occurred in 3 major touristic zones in the north, west and east of the island. Popular touristic areas are situated in the north (Grand Baie); the Port Louis waterfront in the capital offers shopping facilities and leisure activities. Hotel properties occupy around 44.5km (14%) of the coastline and bungalows have been built along 323 km occupying 16% of the entire coastline. Public beaches represent approximately 28.3 km (9%) of the coastline and most of the beaches are devoid of proper amenities coupled with a serious lack of inland recreational/leisure amenities as compared to those offered by the hotels. The concentration of the population in the narrow coastal strip has created several user conflicts.

Access of the public to beaches or of fishermen to their boats as well as dredging of the lagoon for coastal expansion have generated perpetual conflicts (Ramessur and Fagoonee, 1999). Disposal of dredged material, sand mining, jetty constructions, filling of wetlands, mangrove destruction and high-speed water sports are all present-day problems. Conflicts have recently arisen between the fishing and the hotel industry in the south east and east of the island due to hotel expansion projects along the coastline and islets at Ile aux Cerfs and Iles aux Deux Cocos. A conflict between the fishermen in the northwest of the island and a construction company was also recorded in 1998 following offshore extraction of sand at Albion for commercial purposes. There is at present a need to manage the 49 inshore islets (area ranging 253 m²-253 ha) around Mauritius and to develop IRS (Integrated Resort Schemes) in the coastal areas.

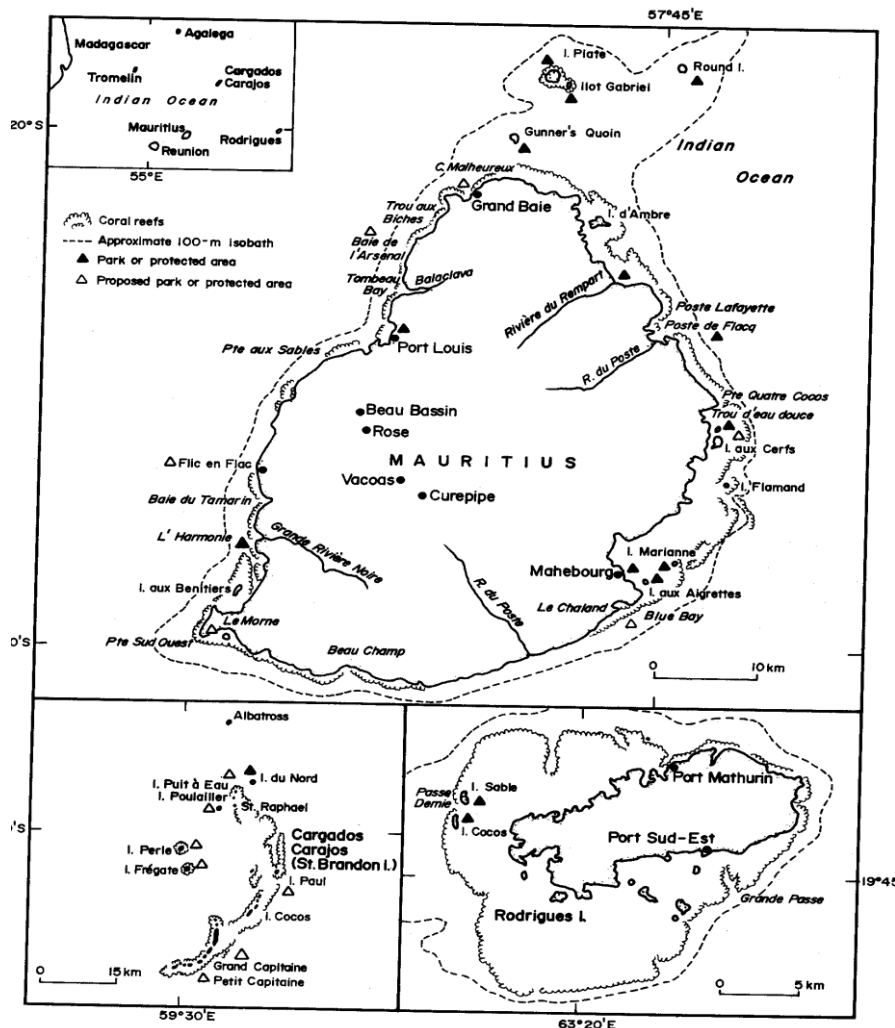


Figure 2. Fringing reefs around Mauritius and Rodrigues.

Coral bleaching and ecotourism in Mauritius.

The unprecedented bleaching event of 1998 affected up to 90% of many shallow living corals throughout the Indian Ocean region, massive mortality occurred in the Seychelles (Turner *et al.*, 2000b), Chagos Archipelago and St Brandon and along the East African coast (Linden and Sporrang, 1999), and many of these reefs have now eroded to rubble. Mauritius also experienced raised sea surface temperatures of 1 to 1.25°C during February 1998 but mass bleaching of corals did not occur due to high cloud cover, high rainfall and low sunshine during the passage of cyclone Anacelle (Fagoonnee *et al.*, 1999; Turner *et al.*, 2000a). Severe coral bleaching and mass mortality that would have occurred due to the synergistic effects were mitigated by the cyclone.



The most likely impacts of reef degradation due to coral bleaching in Mauritius will be on the two common socio-economic reef based activities, namely fisheries and tourism: (1) artisanal catch rates may decrease and the catch composition may shift towards the herbivorous species. (2) the target species of the offshore FADs are the large predatory pelagics that forage near the reefs on reef fish, so these devices may also offer lower catch rates (3) major shifts in the ecology of these small scale fisheries may occur due to over-exploitation pressure, (4) the fishermen may no longer disperse their effort over larger areas to decrease fishing effort locally, and (5) being a beach, dive and snorkel destination.

In 2006 the tourism industry has attracted more than 750 000 tourists annually. Tourism, particularly coastal and marine based, is among the most important sectors of the Mauritian economy as a source of foreign income. The widely practised types of tourism include beaching, swimming, snorkelling and diving, boating, skiing, parasailing and gamefishing. The coastal sites chosen for tourism are largely exploited for their beauty and exoticism, aesthetic value and natural habitats with remarkable biodiversity (e.g. coral reefs, sand beaches and dunes, warm, clear and attractive lagoon water). The rapid expansion of the hotel industry has brought economic benefits both to the public and private sectors. There is at present a need to manage the 49 inshore islets around Mauritius. Many of the islets are under-utilized and many of them through a proper land use zoning can be used for conservation, education, recreation and eco-tourism projects. The main piece of legislation for providing for the protection and management of offshore islets in Mauritius are: Forests and Reserves Act 1983, Wildlife and National Parks Act 1993, Pas Geometrique Act 1895 and the State Lands Act 1874. The 49 islets have been grouped into 3 categories- Strict nature reserve with restricted access, open nature reserve with controlled access and tourist and recreational with free access. Many of the offshore islets are biologically important and have conservation potential due to their unique native and endemic flora and fauna.

Trace metal contamination in urbanized estuaries in Mauritius.

In Mauritius, estuaries are sensitive areas with a very sensitive and ecologically important fauna and flora. Sediment serves as a source and a removal mechanism for some contaminants, and as a vehicle for contaminant transport downstream. Industrial and urban development coupled with a rise in the tourism industry have led to major concerns in pollution problems, especially in estuaries with fishermen communities giving rise to conflicts amongst the various coastal stakeholders. Investigations have been carried out to determine three trace metals (Cr, Zn and Pb) in sediments in 6 urban and rural estuaries- Grand River North West (GRNW), St Louis River, Flic en Flac rivulet, Tamarin, Grande Riviere Noire and Petite Riviere Noire in order to assess any potential estuarine sediment trace metal contamination, Fig 3. Cr, Zn and Pb in surface sediments of the 6 estuaries along the western coast of Mauritius were also statistically compared and any common linking in biogeochemical cycles investigated during the period 2000-2005 (Ramessur *et al.*, 2001; Ramessur 2004).



Trace metal analysis in surface sediments.

Cr, Zn and Pb were determined in the extracted solution from surface sediments collected along the 6 stations during the period July 2000 – January 2005 using a UNICAM 929 Atomic Absorption Spectrometer (AAS) (Analytical Technology Inc. 1993). Standards used for calibration for trace metal determination in sediments were prepared from standard 1000 mg l⁻¹ stock solution. The working solutions (10 mg l⁻¹) of each Zn, Pb and Cr were prepared by diluting the stock solution in a 100 ml volumetric flask with deionised water. Standards were then prepared in the range of 1.0-4.0 mg l⁻¹ for Zn and Pb and 1.0-5.0 mg l⁻¹ for Cr. Flame AAS used for trace metal analysis in surface sediments involved the use of a mixture of acetylene and nitrous oxide for Cr at a wavelength of 357.9 nm and an air-acetylene flame for Pb and Zn at a wavelength of 217.0 and 213.9 nm respectively. The sample of carrier gas flow rate was maintained between 200-500 ml min⁻¹.

Quality Control.

The accuracy and precision of the method was evaluated using three replicate determination of NIST SRM 1646a for estuarine sediments which yielded 25.6 ± 1.8 mg kg⁻¹ (Cr); 40.5 ± 1.2 mg kg⁻¹ (Zn); 8.7 ± 1.3 mg kg⁻¹ (Pb) compared to certified values of 40.9 ± 1.9 mg kg⁻¹ (Cr); 48.9 ± 1.6 mg kg⁻¹ (Zn) and 11.7 ± 1.2 mg kg⁻¹ (Pb) respectively (mean and standard deviation) as determined using ICP MS by NIST with % recovery as 62.8%, 82.8% and 74.4% for Cr, Zn and Pb respectively. The main causes of losses were during the digestion procedure and also included random and systematic sources of uncertainty during analysis using the atomic absorption spectrometer. Necessary corrections were made accordingly. The detection limits were 2.3, 2.2 and 1.2 mg kg⁻¹ for Cr, Zn and Pb respectively. (The limits of detection were taken as 3 σ of three replicates of the procedural blank digested filter paper (3x standard deviation about the mean)).

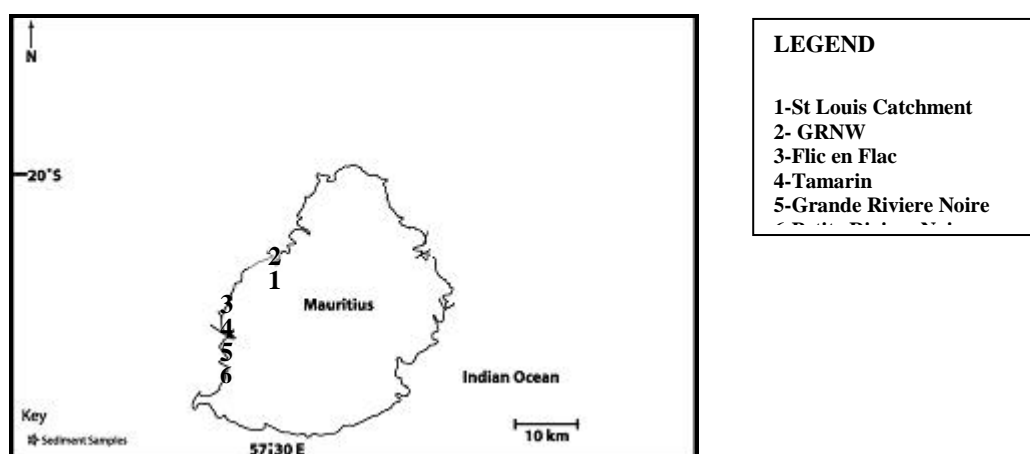


Figure 3. Sampling Stations along estuaries on the Western Coast of Mauritius. (urban estuaries –stations 1 and 2; rural estuaries- stations 3-6).



Station	Mean Cr	Mean Zn	Mean Pb
Upstream St Louis	192.1 ± 85.8	268 ± 46.1	45 ± 6.6
Downstream St Louis	229.2 ± 75.1	261 ± 33.8	55 ± 6.1
1. St Louis estuary	177.6 ± 86.1	159.5 ± 61.7	31 ± 8.8
2.GRNW	278.2 ± 108.0	174.1 ± 58.8	36.3 ± 17.3
3.Flic en Flac	138.1 ± 52.3	25.9 ± 11.2	26.6 ± 17.6
4 Tamarin	215.2 ± 88.2	57.6 ± 55.3	22.7 ± 17.7
5. Grande Riviere Noire	259.1 ± 116.4	87.2 ± 2.3	19.2 ± 13.2
6.Petite Riviere Noire	283.9 ± 84.6	137.4 ± 12.4	25.9 ± 16.1
Range in estuaries.	5.6-15 ¹ 20-250 ²	62-470 ¹ 15-230 ²	12-64 ¹ 5-60 ²

Table 1. Mean trace metal concentrations in estuarine sediments during the period 2000-2005 in mg kg⁻¹.

1 Fernandez *et al.* (1994), lagoon sediments.

2. Vaithyanathan *et al.* (1993), Cauvery Basin, India.

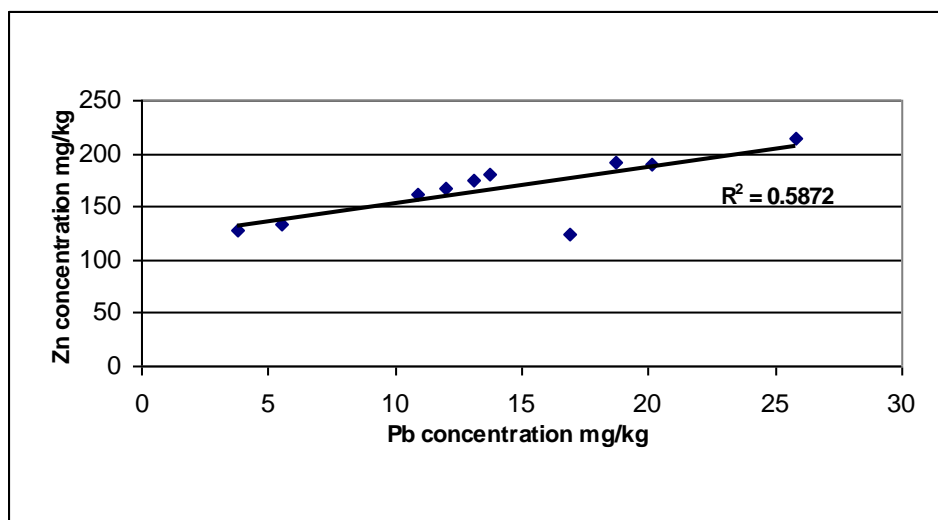


Figure 4. Correlation of Zn and Pb in urban estuarine sediments of Grand River Bay, Mauritius.

The reported results of Cr, Zn and Pb in surface sediments are shown in Table 1. Zn and Pb were significantly higher downstream St Louis (station 2) compared to Tamarin estuary (station 4) at 5 % significance level. Zn was significantly lower in Tamarin compared to Petite Riviere Noire estuary. Cr was not significantly different in sediments collected from GRNW, Tamarin and Petite Riviere Noire estuaries.



Cr was also not significantly different for the estuaries and can be considered of basaltic origin of the volcanic island. Zn and Pb in the urbanised estuarine sediments of Grand River Bay were significantly positively correlated at 5% significance level ($r^2 = 0.59$, $n=10$). Both Cr and Zn in sediments exceeded the target values of 100 and 180 mg kg⁻¹ in contaminated sediments adopted from the draft standards (24% clay and 10% organic matter by weight) from Netherlands (Van Veen and Stortelder, 1988) respectively at some stations. However, Pb was within the 50 mg kg⁻¹ target value. For comparison purposes, the values of Pb in the sediments in the 6 estuaries were also below those reported by Miller *et al.* (2000) who reported high Pb (33-996 mg kg⁻¹) whereas Cr in the 6 estuaries had values similar to Cr (120-300 mg kg⁻¹) concentrations in Holy Loch sediments in Scotland. Both Zn and Pb were also significantly higher in sediments downstream St Louis compared to the estuarine sediments from rural areas (stations 3-6) at 5 % significance level. The presence of Zn and Pb in St Louis can be attributed to roadrunoff and urban activity prevailing in the area. The concentration of Zn and Pb were greatest in the more urbanised upper and lower reaches of the St Louis estuary during the period of study. Pb and Zn were significantly positively correlated in the urbanized estuarine sediments as shown in Figure 4 indicating that the cycling of Pb and Zn were linked as similarly reported by Vasconcelos *et al.* (1995) who found strong positive correlations between Pb and Zn for sediments in a tidal estuary in Brittany.

At present, compared to contaminant levels found in the UK and elsewhere, Mauritius still looks relatively uncontaminated but there is growing concern about trace metal contamination. The decontamination of contaminated sites of the estuary in urban areas will become necessary to prevent harm to the environment in the long term. Any engineering solution for this problem in order to be implemented has to take into account the distribution of the amounts of Cr, Zn and Pb in the Grand River estuary. Furthermore, the evaluation of sediment remedial alternatives should consider their feasibility, contaminant losses, overall environmental impacts and total project costs. There will also be a need for long-term perspectives in estuarine management to involve integrated strategies in which water-sediment interactions need to be considered and international standards for sediment quality developed. Such studies undertaken in the future would then further the understanding of the biogeochemical processes of estuarine system which could be used in environmental development schemes and effective integrated coastal zone management of small island states.

Submarine Groundwater Discharge in lagoons.

Recent eutrophication in several Mauritius lagoons has highlighted the need for a greater understanding of nutrient sources to lagoon waters. Submarine groundwater discharge (SGD) into the marine environment is one possible transport mechanism for excess terrestrial nutrients to reach the sea. However the direct discharge of groundwater into the sea has been difficult to measure, since fluxes may be episodic and patchy in distribution.



The coastal environment of Mauritius receives significant submarine groundwater discharge (SGD), the seepage of fluids through coastal marine sediments from the underlying aquifer into the overlying coastal ocean. Submarine groundwater discharge (SGD) using radium tracers have been investigated in 2005 during the UNESCO-IAEA expedition in Mauritius to investigate seepage in the Flic en Flac lagoon, including seawater cycling within submarine sediments and groundwater discharge from the Curepipe aquifer which can significantly contribute to coral reef degradation in the lagoon and as a pathway for nutrients (Burnett *et al.*, 2006). The rate and distribution of SGD was measured using ventilated benthic chambers on the floor of the lagoon in Flic en Flac. Discharge rates were found exceeding 490 cubic centimetres of pore water per square centimetre of seafloor per day in Flic en Flac lagoon. High SGD rates were associated with low pore water conductivity in the region of a freshwater spring and large variations were seen over distances of a few meters which could be associated to the geomorphologic features of the fracture rock aquifer underlying a thin blanket of coral sands as well as the presence of lava tubes leading to sites of high discharge (Anon., 2005). Understanding the multi-variable dimensions of subterranean estuaries in Mauritius will have important implications for protection of coral reefs and measures for restoration including coral transplantation are being envisaged. Natural tracers, materials present in groundwater that behave conservatively after mixing with lagoon waters, have been used to determine the SGD flux to coastal waters. The concentrations of naturally occurring radium isotopes (^{224}Ra and ^{223}Ra), an element that desorbs from aquifer sediments when fresh water and salt water interact within the coastal aquifer, in coastal lagoons to determine SGD are being presently investigated. SGD is typically a mixture of two sources, including seawater cycling within submarine sediments and groundwater discharge from terrestrial aquifers. This last component of SGD provides a conduit for anthropogenic constituents from the terrestrial environment to enter the marine environment. However, unlike surface flow from streams and rivers, it is much harder to monitor SGD because seepage occurs beneath the sea surface and can be dispersed over a large area with much of the mixing and other important processes occurring within coastal marine sediments (Moore 1999). SGD in the coastal lagoons of Mauritius occurs as disperse flow through sediments and at large submarine springs. Given the negative correlations between radium concentrations and salinity found in the lagoon waters of Mauritius (Figure 4) it is apparent that lagoon salinity is a function of SGD (Eagle and Ramessur, 2003). As has been observed previously, groundwater flow occurs at underwater springs at a much higher rate than the more widespread bulk groundwater seepage through sediments, however this later component, which is difficult to measure, may contribute the majority of groundwater flux. Given the potential for groundwater transport of nutrients far from their sources and the sensitivity of the marine environment to excess nutrients, there is a clear need for greater understanding of SGD nutrient sources to Mauritian lagoons and its implications for ICZM.

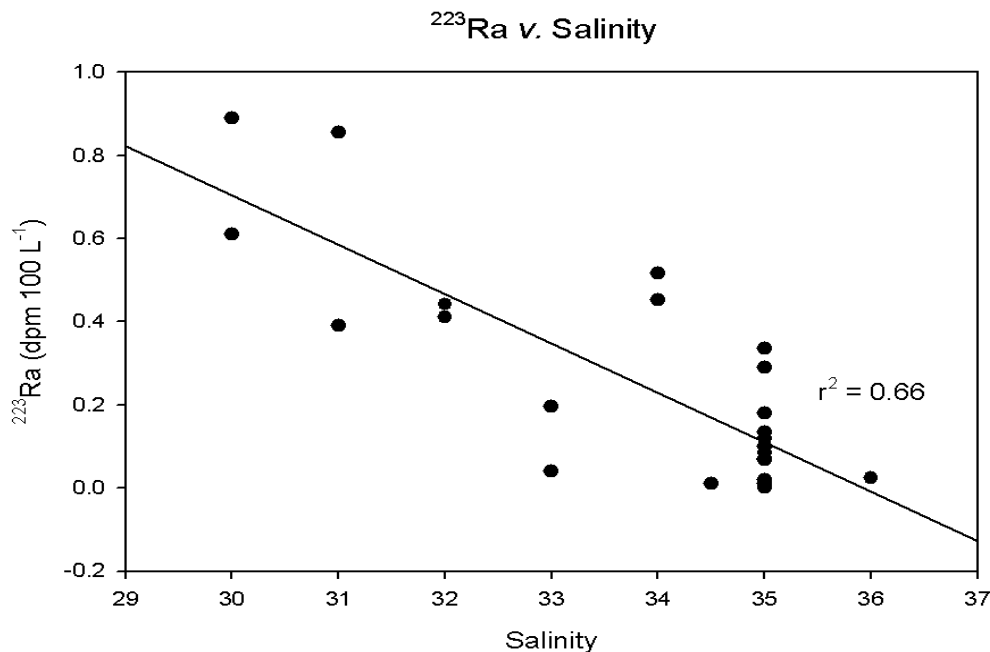


Figure 4. ^{223}Ra v. salinity for lagoon samples from the west and east coasts in Mauritius during January and March 2003 ($r^2 = 0.66$).

Strategies and Requirements for ICZM.

The principle of interdisciplinarity and an integrative approach of all the problems encountered in the coastal zone are actually being implemented in Mauritius. The coastal zone is being viewed as one complex multidisciplinary entity with the various conflicting uses and activities taking place within the zone. There is an urgent need to further protect sensitive marine and coastal areas besides coral reefs such as wetlands, islets, seagrass beds and mangroves and encourage the use of environmentally cleaner technology in industries including the recycling of wastes.

As insufficient suitable baseline data on the marine and coastal environment is available in Mauritius projects on lagoonal health characteristics and coastal pollution monitoring have been implemented since 1991 to provide baseline data in the field of marine ecology, marine pollution and coastal physical oceanography. It is also recognized that there is a general lack of scientific data on trace contaminants and their dispersal mechanisms, SGD and on marine pollution indicators. Studies are now aimed towards strategies to better protect, manage and conserve marine ecosystems. The requirements of an Environmental Impact Assessment (EIA) is mandatory for any coastal development project as scheduled under the EP A Act and new coastal water quality standards for recreational activities and mariculture are under preparation. Waste treatment plants by polluting industries and major hotel complex have also become mandatory and assistance is being sought for the implementation of the provisions of the provisions of MARPOL in Mauritius. Necessary equipment have been procured recently to implement an oil contingency plan for the harbour in case of oil spill.



Application of a Geographical Information System (GIS) for coastal and marine resources is now underway and collaborative research exists with various institutions on a bilateral basis for capacity building and for improving quality of resource assessment. The use of GIS has gained more importance in planning processes for coral reef management and has provided information for sensible policy-making for the south east coast. GIS is facilitating the inventory of present and planned land-use and assessment of impact of proposed development and land-use changes. Mauritius has included plans for promoting sustainable tourism as well as protection of the coastal belt in its National Physical Development Plan in 1993. A considerable amount of improvement has been noted over the recent decade following the enactment of the Environmental Protection Act (EPA) in 1991. In Mauritius, there are indirect incentives in the form of tax credits for importation of pollution abatement facilities to encourage industry to invest in new production equipment and clean technology. The reef monitoring network is a sub-regional node of the Global Coral Reef Monitoring Network and supported under a GEF mid-size project. The European Commission considered the ICZM programme as a pilot one among the many programmes it supported with African/Caribbean/Pacific (ACP) countries and island states.

Institutional capacity building and legislative framework.

The lack of adequate institutional capacity is one of the major constraints in achieving biodiversity conservation in the Western Indian Ocean. Many targeted marine protected areas have not advanced beyond proposals and there is a need for institutional capacity building and strengthening for effective control of activities outside marine protected areas. Consultative committees have been set up to provide necessary stake holders inputs into coastal and marine management decisions. Mauritius has ratified and adhered to international law or legal instruments such as the 1982 United Nations Convention on the Laws of the Sea (UNCLOS), Convention for International Trade of Endangered Species (CITES), the IMO Convention of 1973 for the prevention of pollution from ships, as modified by the Marine Pollution (MARPOL) protocols of 1978, the Code of Practice for Responsible Fishing and Agenda 21 of UNCED for sustainable development of marine living resources. protection of the marine environment and preservation of biodiversity (including the 1992 Convention on Biological Diversity). Enactment of national laws include the basic principles enunciated in International Conventions such as the Continental Shelf Act of 1970, the Territorial Sea Act of 1970, the Port Act of 1976, the Maritime Zones Act 1977, the Fisheries Act of 1980 (in the process of being replaced by the Fisheries and Marine Resources Act 2001) and the Environment Protection Act of 1991.

There is a pressing need for the preservation of coastal and water resources. Improved sewage and effluent disposal, pollution control, solid/hazardous wastes and wastewater management, effective legislation and enforcement through integrated coastal zone management as formulated in the National Environmental Action Plan II in 1998 are seen to provide a basis for an adequate response. Under the 1990 amendments to the Central Water Authority Act in Mauritius, limits for polluting effluents have been determined. Even some of the industries are now taking significant steps to improve wastewater management practices by upgrading treatment systems with more appropriate technology following the recommendation of "Sector-based Effluent Limitation Standards". At present, there is also an urgent need for a comprehensive set of groundwater standards to ensure there is no decline in the quality of this freshwater resource.

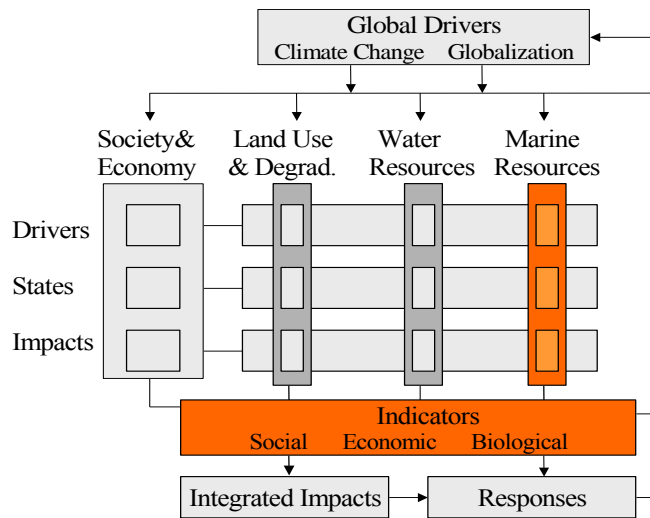


Figure 5. Integrative framework to address causes of threats to the environment in small island states.

From a technical perspective existing coastal inventorying enabling coastal zone management of small island regions can benefit from advancement in GIS application and environmental networking. There is, however, a need to synthesize and organize existing reports and data into a common framework (Figure 5) that assists:

- harmonizing the descriptions the current status of the country's diverse coastal stakeholders and social players,
- filling existing gaps in knowledge with data collection and scientific inquiries,
- identifying social and economic drivers of demographic changes and household attributes (e.g. age structure, dependency ratios, fertility changes, migration, education, employment and income) by ethnicity and geographic location, and
- relating socio-economic change to expected demands for environmental resources (land use, water resources, marine resources) and environmental impacts as proposed under the MERMAID 2001 project (Mauritius Environmental Resource Management and Industrial Development).

Future data collection should therefore help extending the database and to include fishery areas, navigational routes, new recreation points, SGD and waste disposal sites. Remotely sensed data of the region have to be transferred to the GIS database to visualize and map pressure, state impact relation features. In a Mauritian example the use of GIS has gained more importance in the planning process and has provided information for sensible policy-making for the south east coastal region. GIS is facilitating the improvement of the inventory of present and planned land-use and the related impact assessment of proposed developments allowing to develop and visualize scenarios of different use options. Based on this kind of information Integrated Coastal Zone Management is an adaptive process of resource management for environmentally sustainable development (Ramessur and Santally 2003). Once implemented an ICZM plan is not expected to be static but forms an iterative mechanism continuously evolving and which has to evaluate and eventually redefine its internal milestones regularly. This will ensure to meet the dynamic goals deriving from temporal and spatial changes that have to be made to the management objectives subject to changing demand or legislation.



For a future global change research focus on island dominated regions it is suggested to develop and compare three larger integrated pilot projects in the Pacific-Indian Ocean and for example the Wider Caribbean. They should be aimed to investigate in higher detail the current status and observed and expected changes of material fluxes from drainage basins/islands including transboundary impact assessment considering the ocean and atmospheric inputs. The overall objective should be to elucidate and model the land-sea interactions and human dimensions of change in these specific and vulnerable coastal regions of small islands. These projects could be accommodated appropriately as regional and multidisciplinary contributions to the global assessment efforts of a future IGBP/LOICZ project established under the Earth System Science Partnership, ESSP, of the IGBP, IHDP, WCRP and Diversitas (Ramessur 2002).

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MODIFIED SHAPE PARAMETER FOR REPRESENTING EQUILIBRIUM BEACH PROFILES

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This paper studies analytical solutions for the expression of shape parameter, which is necessary for the theoretical definition of equilibrium beach profiles. The results are tested and compared with previously estimated values given in graphical and tabular forum. At present, the shape parameter is directly related with sediment settling velocity; however, there is no continuous relation to calculate settling velocity over a wide range, which in turn limits the wide range of analytical solution for shape parameter. Empirical definition of shape parameter is not resulting with accurate solutions which intends to present alternate analytical expressions. Representative beach profiles for the U.S. East coast and the Gulf of Mexico are fit to two expressions –analytical and graphical- of shape parameter involved in well-known “ $h=Ax^{2/3}$ ” beach profile shape. Results indicate that the analytical solutions of shape parameter significantly improve the accuracy of the predicted profile at the vicinity of coastline until the depth of closure, but poorer results achieved as the beach profile extends offshore.

Key Words: *Beach Profile; Equilibrium; Grain size; Shape parameter.*

1. INTRODUCTION

An essential requirement in engineering models for understanding and interpreting a number of coastal processes is an accurate description of equilibrium beach profile shapes. Basically, the equilibrium beach profile is defined as the cross-shore profile of constant shape, which is approached if exposed to constant forcing conditions for a sufficiently long time. Beach profiles are very complex shapes but in overall form, they exhibit a surprisingly persistent concave shape. Usually, steep slopes are observed near shoreline, followed by progressively decreasing slope as water depth increases. The validity of this concave formation is verified through a large number of laboratory experiments (Waters 1939); Rector (1954) and Saville (1957)) which are known to be the preliminary studies on the analysis of beach profiles.

Bruun (1954), who construct the bridge between laboratory studies and theoretical background, proposed the “power law” for the description of beach profiles. He described the water depth as a function of offshore distance on an assumption of an equal bottom stress exerted by the waves. Later, Bruun’s power law is supported by Dean (1977) on theoretical ground. Dean assumes that equilibrium conditions on beach profiles can be achieved when wave energy dissipation per unit water volume along the profile is constant. The result of his study satisfies a simple empirical relation following a constant named “shape-parameter”. Later, Moore (1982) related the empirical shape parameter, A, to the median grain size. A similar well known Dutch approach is presented by Vellinga (1986). Vellinga computed the beach profile by using the idea of a closed sediment balance at the surf zone. He discussed the relation by reflecting the effect of grain size on the eroded profile.



The form of beach profile given by Dean (1977) is later modified by adding a small linear section to the beach profile at the vicinity of shoreline and thus eliminating the singularity at the coastline. This shape is called Dean-Moore-Wiegel profile (Kriebel and Dean (1993); Foster *et al.* (1994); Work and Dean (1994)) and it characterizes the shape of steep slope at the shoreline. Dean's profile and its generalizations are used widely in applied problems for the estimation of stability of underwater slopes and for the computation of balance of cross-shore sediment transport. There are other suggested studies, which do not lead to a singularity at the shoreline. In particular, an exponential shape is suggested by Bodge (1992) and Komar and McDougal (1994). They claim that failure of the Deans profiles is evident in analyzing the beach slope variations since the model predicts an infinite slope at the shoreline.

Lee (1994), by means of Airy's Wave Theory, expresses the geometry of the equilibrium beach profile in an explicit form in relation with the offshore wave period. He discuss the Dean's profile, implying that it is an empirical model and mentioning that the hypothesis to relate the wave energy dissipation with particle movement is a vague one since energy is a scalar quantity not a vector.

Whatever the negative inferences about the Dean's beach profile model are, still it is the best known and most commonly used model in beach profile applications. Another discussion, which is a disadvantage about the Deans model, is the use of shape parameter. The shape parameter is an empirical variable, which is defined only in limited sediment diameter intervals. The objective of the present study is to develop an analytical solution for the definition of the shape parameter. Analytical solution also helps representing the shape parameter in a wide range of intervals of sediment diameter and its fall velocity. The validity of the resultant equation is checked by illustrating its use by comparing it with the data supplied by Dean, (1977) taken from the Atlantic and Gulf Coasts.

2. EQUILIBRIUM BEACH PROFILE MEASUREMENTS

Based on macro-scale measurements, under constant sediment size and long term wave climate, beach profiles are generally tend to maintain a steady shape. The steady shape means that there exists equilibrium where net sediment displacement along the beach profile can be accepted as zero. Such equilibrium beach profiles appear in cases of sandy beaches and in areas where longshore transport gradients can be neglected. Roelvink and Broker (1993), in their analysis observe that equilibrium beach profile concept can be used extensively in the analysis of response of a beach to long term or extreme wave conditions. Cooper *et al* (2000) fill the gap between theoretical and practical uses of beach profile data by providing a summary of the key elements of beach profile measurement, theory and analysis.

Bruun (1954) and Dean (1977) introduce a model to define the shape of beach profiles that exhibit concave shape and tend to maintain a generally steady shape under constant sediment size and long term wave climate. The model is a simple power rule relating water depth, to the offshore distance. Dean (1993) improve this simple power law on theoretical grounds by assuming that the equilibrium profile is associated with the uniform dissipation of wave energy per unit volume at the surf zone as

$$\frac{1}{h} \frac{dEC_g}{dx} = -D_{eq} \quad (1)$$



where D_{eq} represents equilibrium wave energy dissipation rate per unit volume, h is local water depth at a distance x from the shoreline. Dean (1991) also assume that the shallow water breaking wave height is proportional to the water depth as denoted by Dally *et al.*, (1984). These assumptions support the simple power law on theoretical basis with a proportionality constant “A” known as shape parameter.

$$h(x) = Ax^{2/3} \quad (2)$$

Shape parameter depends on stability characteristics of the bed material. It defines the disturbance of sediment particles depending on the equilibrium energy dissipation rate, D_{eq} , and sediment characteristics such as water mass density.

$$A = \left(\frac{24}{5} \frac{D_{eq}}{\rho g^{3/2} \kappa^2} \right)^{2/3} \quad (3)$$

where ρ is water mass density; g , gravitational acceleration and κ stands for ratio between wave height and water depth at break. Before Dean (1991), Moore (1982) shows that the shape parameter can also be defined by using the fall velocity of sedimentary particles as an argument.

$$A = 0.067w^{0.44} \quad (4)$$

where w is fall velocity of the sediment particles. Kriebel *et al.* (1991) develop a similar correlation, which is appropriate for sediment sizes typical of sand beaches where the fall velocity is between 1 to 10 cm/sec. Their expression is given as;

$$A = 2.25 \left(\frac{w^2}{g} \right)^{1/3} \quad (5)$$

Adding small linear section in the vicinity of shoreline, thus eliminating the singularity at the coastline, the Equation (2) can be modified as,

$$x = \frac{h(x)}{s} + \left(\frac{h(x)}{A} \right)^{3/2} \quad (6)$$

where s is the slope of the beach profile. This shape is called Dean-Moore-Wiegel profile and it is once more evident that the definition of shape parameter cannot be passed up from beach profile measurements. The variation of sediment shape parameter, A with sediment size is presented in Table 1, where the results are based on least squares fit of Equation 1 (CERC, 1998).

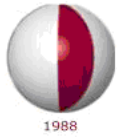


Table 1 Recommended A values in CERC, 1998.

D(mm)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.1	0.063	0.0672	0.0714	0.0756	0.0798	0.084	0.0872	0.0904	0.0936	0.0968
0.2	0.100	0.103	0.106	0.109	0.112	0.115	0.117	0.119	0.121	0.123
0.3	0.125	0.127	0.129	0.131	0.133	0.135	0.137	0.139	0.141	0.143
0.4	0.145	0.1466	0.1482	0.1498	0.1514	0.153	0.1546	0.1562	0.1578	0.1594
0.5	0.161	0.1622	0.1634	0.1646	0.1658	0.167	0.1682	0.1694	0.1706	0.1718
0.6	0.173	0.1742	0.1754	0.1766	0.1778	0.179	0.1802	0.1814	0.1826	0.1838
0.7	0.185	0.1859	0.1868	0.1877	0.1886	0.1895	0.1904	0.1913	0.1922	0.1931
0.8	0.194	0.1948	0.1956	0.1964	0.1972	0.198	0.1988	0.1996	0.2004	0.2012
0.9	0.202	0.2028	0.2036	0.2044	0.2052	0.206	0.2068	0.2076	0.2084	0.2092
1.0	0.210	0.2108	0.2116	0.2124	0.2132	0.214	0.2148	0.2156	0.2164	0.2172

3. MODIFIED SHAPE PARAMETER

Simple power rule is a rational equilibrium profile expression, because it supports the notion of uniform energy dissipation per unit volume across the surf zone (Dean, 1991). It must be noted that this rule is developed under three important considerations: (1) linear wave theory applies, (2) local wave height has a fixed proportion to local water depth, and (3) the dissipative quality of the bed is uniform across the surf zone. In basic terms, the latter implies that sediment characteristics are uniform across the shore (Bodge, 1992), which is often not the case in nature.

Shape parameter governs the steepness of the beach profile as a function of uniform energy dissipation; unfortunately, random nature of the waves obstruct the definition of shape parameter in terms of energy dissipation. Therefore, most subsequent work done on this has focused on defining shape parameter in terms of sediment characteristics. The most widely used design information available for determining the shape parameter is that of Moore (1982) in which shape parameter is related graphically to the median sediment grain size D , and sediment fall velocity, w as shown in Figure 1.

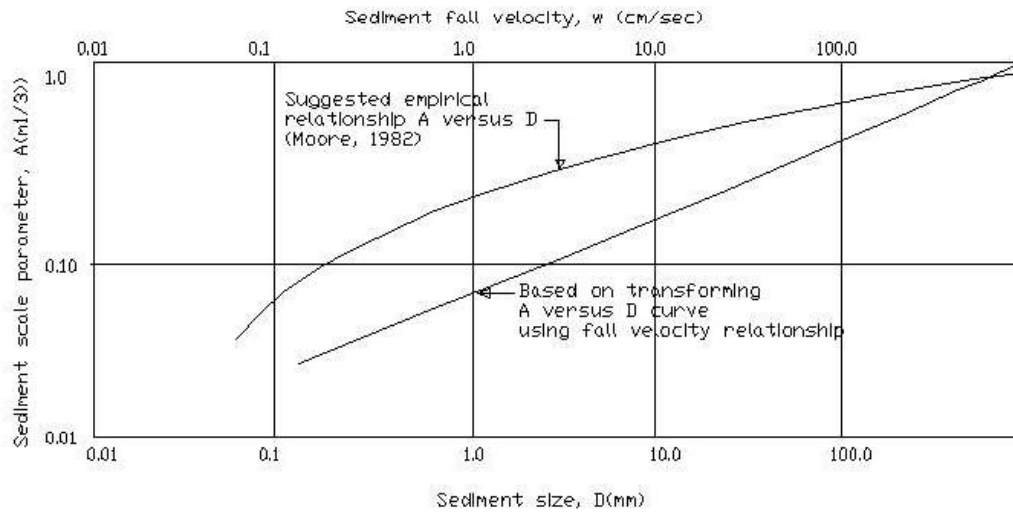


Figure 1 Dependence of A on sediment grain size and fall velocity (Moore, 1982)

Dean (1995) converted the graphical solution of Moore into semi-analytical solution in which the homogeneity in the equation is not achieved. Furthermore, in the graphical representation of shape parameter the fall velocity is given in cm/sec whereas the shape parameter has units, $m^{1/3}$.

Rewriting Equation (4) by changing the dimension of fall velocity into m/sec yields;

$$A = \Omega 0.00883w^{0.44} \quad (7)$$

where Ω is a constant parameter with dimensions of $sec^{0.44}/m^{0.11}$. The alliance of Equation (7) and Figure (1) results in a modified analytical solution of shape parameter; hence the homogeneity in the equation is attributed.

$$A = 0.508w^{0.44} \quad (8)$$

The comparison between the values of shape parameter, given in Table 1, and the values obtained from modified analytical solution in Equation (8) plots the maximum error between the two data as 4.54%, observed at a grain diameter of 0.25 mm, where error is defined as (Figure 2.)

$$\text{error} = \left(\frac{A_{\text{CERC}}}{A_{\text{ESTIMATED}}} - 1 \right) \times 100 \quad (9)$$

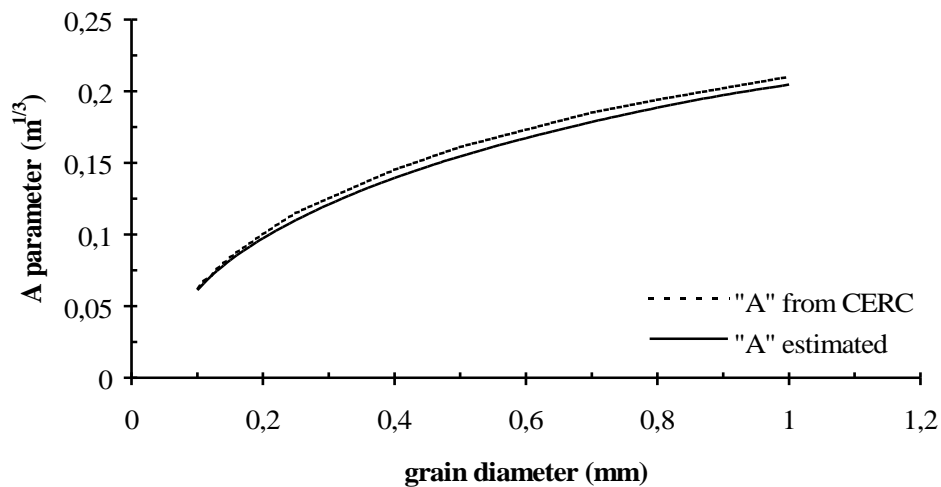


Figure 2 Comparison for shape parameter between the values given in CERC (1998) and estimated by Equation (8)

4. MODIFIED FALL VELOCITY

The fall velocity definition given by Hallermeier (1981) is generally used in predicting the changes of nearshore profiles. The validity of this definition is supported in CERC (1984). However, one difficulty in using the Hallermeier's fall velocity equation is that there is no continuous relation to calculate fall velocity over a wide range, which in turn limits the wide range of analytical solution for shape parameter. In Hallermeier's definitions the value of fall velocity can be determined by the help of three different equations depending on the value of grain buoyancy, A_g . Ahrens (2000) improve the Hallermeier's relation and suggest an alternative formula for the fall velocity of natural sands. The equation approaches logical limiting values for laminar and turbulent flow regimes.

$$w = C_l \Delta g d_{50}^2 / \nu + C_t \sqrt{\Delta g d_{50}} \quad (10)$$

where C_l and C_t represents coefficients that are functions of Archimedes buoyancy index. The two coefficients are not constants but are hyperbolic tangent functions of the Archimedes buoyancy index, which is related to sediment and fluid properties. In the above equation the first term of right hand side is associated with laminar flow regime and the last term is associated with turbulent flow regime.

$$C_l = 0.055 \tanh \left[2A_b^{-0.59} \exp(-0.0004A_b) \right] \quad (11)$$

$$C_t = 1.06 \tanh \left[0.016A_b^{0.5} \exp(-120/A_b) \right] \quad (12)$$



Where

$$A_b = \Delta g D^3 / \nu^2 \quad (13)$$

where $\Delta = (\rho_s - \rho) / \rho$ and ρ_s is the density of the sediment particle and ρ is the density of the fluid, g is acceleration of gravity, ν is kinematic viscosity of water and D is the characteristic median grain size of the sediment particle. The variation in the fall velocity between the results of Hallermeier and Ahrens is given in Figure (3).

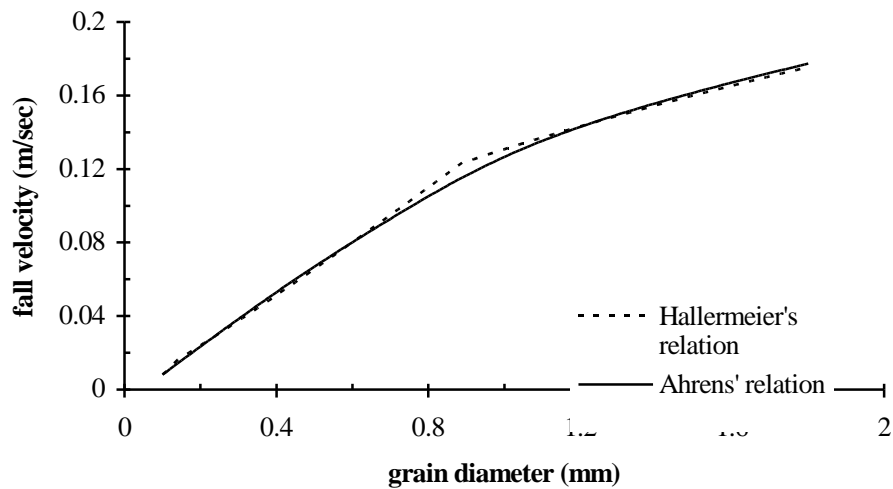


Figure 3 Comparison between the fall velocity definition of Hallermeier and Ahrens

The comparison of equilibrium beach profile corresponding to the sand size of 0.8 mm is shown in Figure (4). The profile presented by analytical solution resulted in milder slope that corresponds to a shape parameter smaller than the one simulated in Table (1).

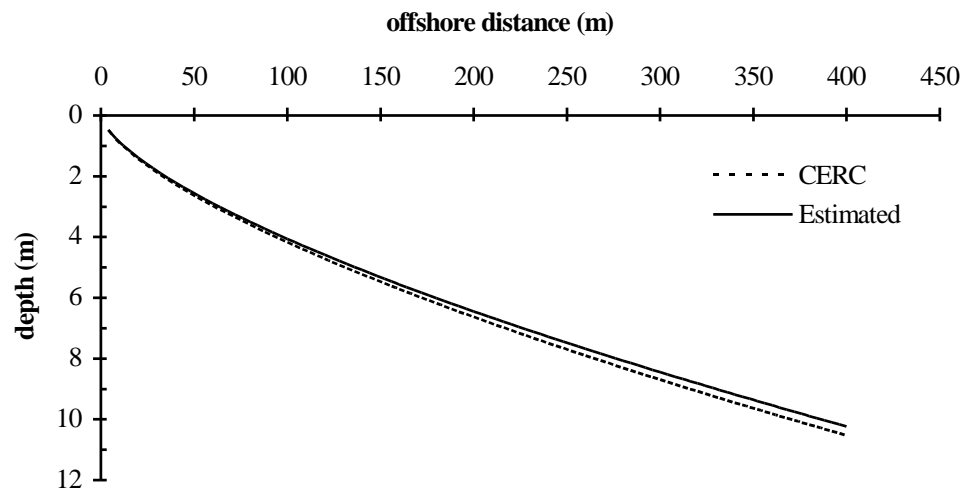
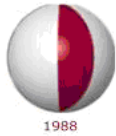


Figure 4 Equilibrium beach profiles for coastal region where characteristic grain size is 0.8mm

5. RESULTS AND DISCUSSION

Modified analytical solution of shape parameter represented in Equation (8), is compared with beach profile data group from the U.S. East coast and the Gulf of Mexico, previously represented by Dean (1977), (Table 2). Dean represented ten data groups characterizing ten reaches of shoreline from New York through Texas. An average beach profile is developed for each of the ten data groups. In this present investigation, four of these average profiles are considered. The other six profiles consist of fine grained ($D < 0.1\text{mm}$) sedimentary particles. The shape parameter value of other six average profiles is matching with the results derived in Equation (8), therefore, necessarily it is not needed to investigate those profiles.

Data Group	Profiles	From	To	Shape parameter, $A \text{ (m}^{1/3}\text{)},$ (Dean 1977)	Shape parameter, $A \text{ (m}^{1/3}\text{)},$ (Equation 8)
I	1-35	Montauk Point, NY	Rockaway Beach,	0.1063	0.1062
II	36-78	Sandy Hook, NJ	Cape May, NJ	0.1452	0.1394
III	79-116	Fenwick Light, DE	Ocean City Inlet,	0.1265	0.1225
IV	117-145	Virginia Beach, VA	Ocracoke, NC	0.1218	0.1176
V	145-159	Folly Beach, SC	Tybee Island, GA	0.0609	0.0609
VI	160-394	Nassau Sound, FL	Golden Beach, FL	0.1044	0.1012
VII	395-404	Key West, FL	Key West, FL	0.0609	0.0609
VIII	405-439	Caxambas Pass, FL	Clearwater Beach,	0.0836	0.0836
IX	440-477	St. Andrew Pt., FL	Rollover Fish Pass,	0.0622	0.0622
X	478-504	Galveston, TX	Brazon Santiago,	0.0662	0.0662

Table 2 Beach profile data groups (after Dean (1977))



Figures 5 to 8 graphically compare the “actual” and “simple power rule” beach profiles for each data group. Simple power rule repeats the profile twice; expressing graphical and analytical results of shape parameter. For these data groups the analytical expression yields a successful approximation to the actual profile likewise the “graphical” expression.

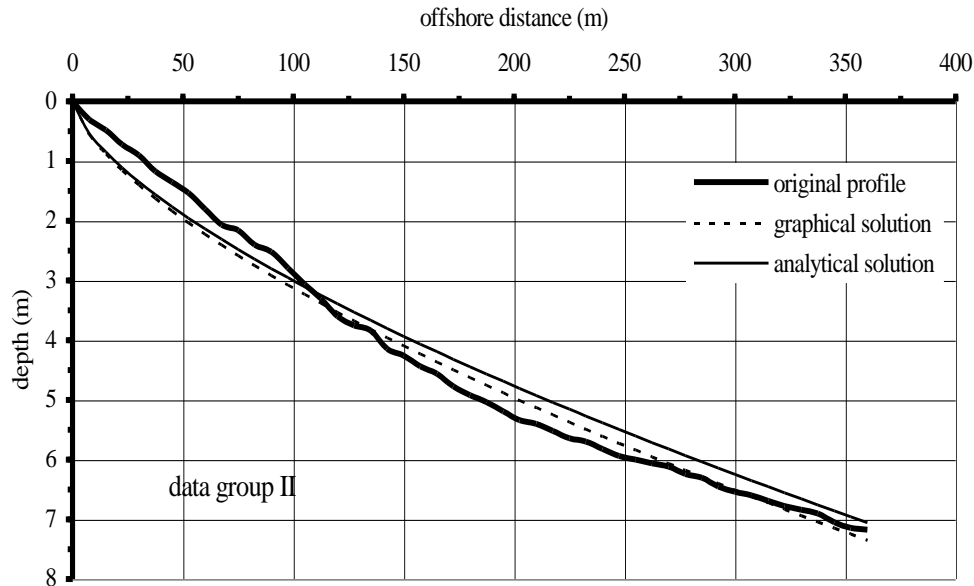


Figure 5 Comparison of “graphical” and “analytical” solutions for data group II

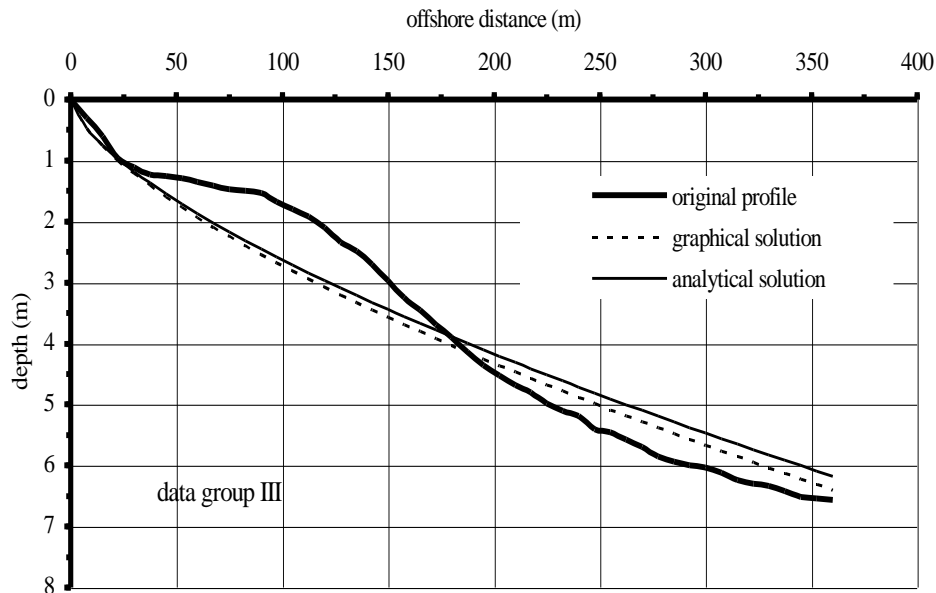


Figure 6 Comparison of “graphical” and “analytical” solutions for data group III

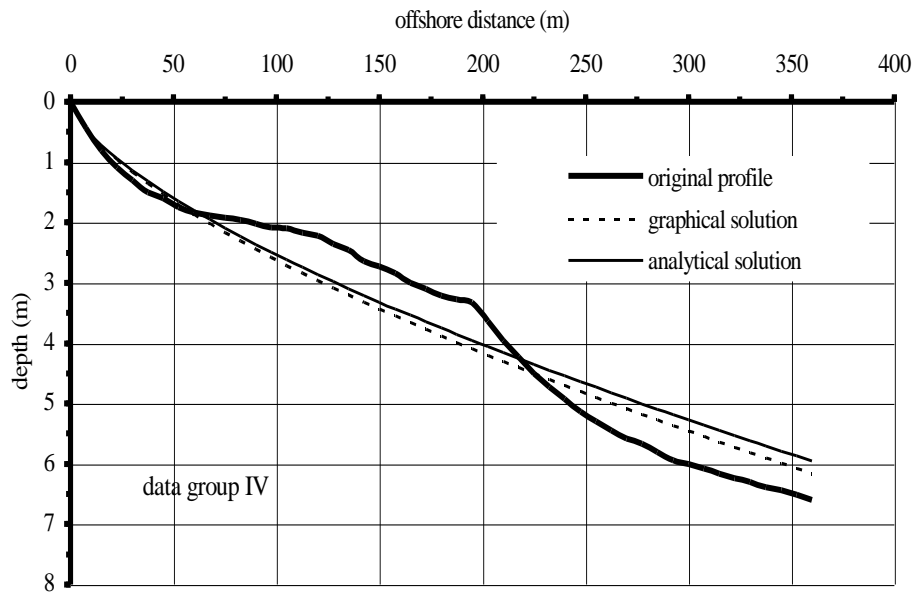


Figure 7 Comparison of “graphical” and “analytical” solutions for data group IV

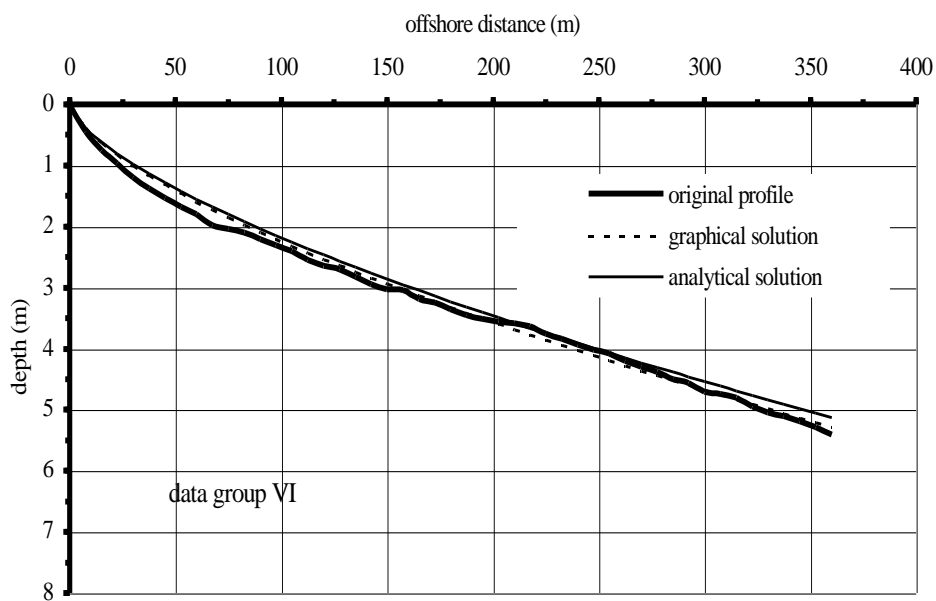
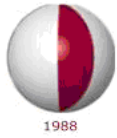


Figure 8 Comparison of “graphical” and “analytical” solutions for data group VI



The quality of fit for data groups, II, III, IV and VI is determined by

$$\delta = \frac{\sum(\chi_i - \chi_{pi})^2}{\sum \chi_i^2} \times 100 \quad (14)$$

where χ is the “actual” depth and χ_p is the depth estimated by either using Equation (8) or Table 1. The subscript i refer to each of 50 uniformly spaced points along the profile used to describe the profile. The available data to represent offshore distance is 360 meters from shoreline. The vertical datum is mean water level and the data that is above the shoreline elevation is ignored in this study.

In Equation (14), the value $\delta = 0$ corresponds to a perfect fit, and increasing values of δ refer to increasingly poorer fit. Table (3) describes the best-fit values of analytical and graphical solutions for each of the data groups described above. For the four data groups it is seen that the graphical expression has its best fit values closer to zero, meaning better fit than analytical method. On the other hand, three of the four groups (II, III and IV) yield better fits when working closer to the shoreline. At 120 meters offshore, the modified analytical expression yields an improved approximation of the actual profile relative to the graphical solution.

Table 3 Predicted and studied shape parameter values for data groups

Data Group	Shape parameter, A (m ^{1/3}), (CEM)	Shape parameter, A (m ^{1/3}) (estimated)	Best Fit value for graphical	Best Fit value for analytical	Best Fit value for graphical	Best Fit value for analytical
II	0.1452	0.1394	0.287	0.483	0.031	0.021
III	0.1265	0.1225	1.483	1.621	0.242	0.194
IV	0.1218	0.1176	1.379	1.529	4.218	3.100
VI	0.1044	0.1012	0.096	0.209	0.009	0.014

The physical significance of analytical expression of the shape parameter is interesting. In all data groups, eventually increase of depth towards the ocean floor is succeeded. The deviations from actual profile somehow increase in the offshore direction. Corollary to this, the analytical expression of shape parameter exhibits a reasonable fit to profile curvature when working nearshore. That is, beach profile representations are generally intended for surf zone applications, such as definition of offshore limit and depth of sediment transport to which a beach nourishment project could take place. The improved definition of shape parameter is therefore likely to be most notable for engineering projects working at nearshore.



6. CONCLUSION

Based on the analysis of numerous beach profiles, under laboratory and field scales, a reasonable approximate and useful form of any monotonic beach profile appears to be represented by Dean's profile, $h(x)=Ax^{2/3}$. This simplex form of beach profile is proved that it demonstrates good results when compared with nature. The constant, shape parameter, which is involved in Dean's profile, can only be defined graphically. This is the main disadvantage of the relation given by Dean (1977). In this study, an analytical description is employed for the shape parameter, allowing a simplified characterization for the relation. The modified analytical equation, Equation (8), is used to describe the representative profile at four different beaches with varying grain sizes. For comparison, the classical graphical solution of shape parameter is also employed to describe the profile data. The analytical profile equations are least-square fitted to the data and it is seen that modified equation allow better fit, especially at nearshore region as compared to the graphical solution. The disadvantage of using an analytical expression is the increase in the number of parameters to be estimated in the solution procedure.

It is hoped that the proposed analytical solutions herein will provide guidance for coastal engineering projects, and serve as a framework for interpretation of project performance and behavior of natural beach systems.

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MEDITERRANEAN ENDEMIC DECAPOD CRUSTACEANS IN THE TURKISH SEAS

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The paper includes a list of the endemic decapod crustaceans of the Mediterranean hitherto recorded in the Turkish Seas. The data have been collected since 1965. Results of the examination of the decapod collections from the entire Turkish Seas and review of the relevant literature showed that the number of decapod species which are endemic of the Mediterranean is 28.

Key Words: *Crustacea Decapoda, endemic, Turkish Seas.*

INTRODUCTION

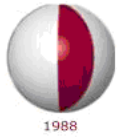
The available information on decapods of the Turkish Seas was very limited until 1950s. Demir (1952), pronounced a list of decapod crustaceans in Bosphorus, and later, Holthuis (1958), listed the decapods of the eastern Mediterranean, including the Turkish Seas. The comprehensive faunistic studies on decapod crustaceans in the Turkish Seas were began in 1965, and up to date, a total of 228 decapod species were reported from all the Turkish coast. The Mediterranean and the Aegean Sea decapod faunas influence directly that of of the Turkish coast, and the native populations of the Mediterranean are a component of enrichment for the Turkish fauna. Since 1965, some papers have sufficiently raised the number of the decapods known from the Turkish Seas. The main objective of the present paper is to present a list of the mediterranean endemic decapod crustaceans in the Turkish coast.

MATERIAL AND METHODS

The surveys were conducted with R/V “Koca Piri Reis” and “Hippocampus”, local fishing boats. All decapod species at the coast of Turkey were collected by scuba diving, dredge, beam-trawl, otter-trawl, mid-water trawl, and grab. The authors examined a large collection of decapods collected at the depths between 0 and 1100 m over the entire Turkish shores.

RESULTS AND REMARKS

Mediterranean endemic decapod fauna of the Turkish coast constitutes only 12.28% of the Turkish fauna. A list belongs to endemic decapods occurring at the Turkish coast were presented in Table 1. Recently, the list of decapod crustaceans in the Turkish Seas was published by Kocataş and Katağan (2003), and it includes a total of 28 Mediterranean endemic decapod species, i.e., 12 Natantia, 6 Anomura, and 10 Brachyura. Ateş et al. (2004), increased to 29 the number of species known by another endemic brachyuran crab recorded at the Aegean Sea coats of Turkey recently.



TSS: Turkish Straits System, **A:** Aegean Sea, **B:** Black Sea, **M:** Mediterranean Sea

NATANTIA	B	TSS	A	M
<i>Automate branchialis</i> Holthuis and Göttlieb, 1958				■
<i>Hippolyte holthuisi</i> Zariquiey-Alvarez, 1953		■	■	
<i>Hippolyte leptocerus</i> (Heller, 1863)	■	■	■	■
<i>Hippolyte leptometrae</i> Ledoyer, 1969			■	
<i>Palaemonetes antennarius</i> (H. Milne Edwards, 1837)			■	■
<i>Parapandalus narval</i> (Fabricius, 1787)			■	■
<i>Philocheras monacanthus</i> (Holthuis, 1961)			■	
<i>Plesionika giglioli</i> (Sena, 1902)			■	
<i>Processa edulis</i> (Risso, 1816)		■	■	■
<i>Processa macrophthalma</i> Nouvel and Holthuis, 1957			■	■
<i>Richardina fredericii</i> Lo Bianco, 1903			■	
<i>Synalpheus gambarelloides</i> (Nardo, 1847)			■	■
ANOMURA				
<i>Anapagurus breviacuelatus</i> Fenizia, 1937		■	■	
<i>Anapagurus longispina</i> A. Milne-Edwards and Bouvier, 1892			■	
<i>Paguristes syrtensis</i> De Saint Laurent, 1971			■	
<i>Pagurus chevreuxi</i> (Bouvier, 1896)			■	
<i>Pisidia bluteli</i> (Risso, 1816)		■	■	■
<i>Pisidia longimana</i> (Risso, 1816)	■	■	■	■
BRACHYURA				
<i>Brachynotus foresti</i> Zariquiey-Alvarez, 1968			■	■
<i>Brachynotus gemmellari</i> (Rizza, 1839)			■	■
<i>Carcinus aestuarii</i> Nardo, 1847	■	■	■	■
<i>Ebalia edwardsii</i> O. G. Costa, 1838			■	
<i>Liocarcinus maculatus</i> (Risso, 1827)			■	
<i>Lissa chiragra</i> (Fabricius, 1775)			■	
<i>Macropodia czerniavskii</i> (Brandt, 1880)			■	
<i>Macropodia longirostris</i> (Fabricius, 1775)	■	■	■	■
<i>Parthenope angulifrons</i> Latreille, 1825			■	■
<i>Pisa hirticornis</i> (Herbst, 1904)			■	
<i>Pisa muscosa</i> (Linnaeus, 1758)		■	■	

Table 1. Distribution of endemic decapod crustaceans in the Turkish seas



Koukouras et al. (1992), reported a total of 37 decapods, (i .e., 16 Natantia, 4 Macrura Reptantia, 5 Anomura, and 12 Brachyura) being endemic species of the Mediterranean from the Greek waters. However, endemic the carideans, *Odontozona minoica* Dounas & Koukouras, 1989, *Periclimenes amethysteus* (Risso, 1827), *Processa acutirostris* Nouvel & Holthuis, 1957, *Processa robusta* Nouvel & Holthuis, 1957, *Thorulus sollaudi* (Zariquiey Cennarro, 1935), the thalassinids, *Callianassa acanthura* Caroli, 1946, *Callianassa candida* (Olivi, 1792), *Calliax lobata* (Gaillande & Lagardère, 1966), *Calliax punica* Saint Laurent & Manning, 1982, and the brachyurans, *Pilumnus aestuarii* Nardo, 1869, and *Portumnus pestai* Forest, 1967 reported by Koukouras et al. (1992) were not recorded in the Turkish seas. On the other hand, here reported the stenopodids shrimp, *Richardina fredericii* Lo Bianco, 1903, and the hermit crab, *Paguristes syrtensis* De Saint Laurent, 1971 were not listed by Koukouras et al. (1992) for the Aegean Sea coast of Greece.

Almaça (1985), stated that the ancestors of the native Mediterranean decapods have most probably been temperate-tropical of the east Atlantic which colonized the Mediterranean in Messinian times.

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FEEDING ACTIVITY OF THE HOLLOWSNOUT GRENADIER, *CAELORINCHUS CAELORHINCUS* (RISSE, 1810) IN THE AEGEAN SEA

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In the present study, stomach contents of 148 hollowsnout grenadier, *Caelorinchus caelorhincus* (Risso, 1810) (113-123 mm TL), were examined. Crustaceans were found to be most important prey groups (MIP; $IRI \geq 1196$, and %IRI= 98.42) in the diet. Polychaetes constituted the secondary prey groups (SP; $1196 > IRI > 133$; %IRI= 1.51). Chaetognaths (%IRI= 0.07) were an occasional prey group (OP; $IRI \leq 133$).

Key Words: *Caelorinchus caelorhincus*, feeding habits, stomach content, Aegean Sea.

Introduction

The hollowsnout grenadier *Caelorinchus caelorhincus* (Risso, 1810) (Fig. 1) is a benthopelagic fish at the depths ranging from 90 to 1250 m (Froese & Pauly, 2006). The hollowsnout grenadier generally distributes in shallower (up to 450-500 m), with smaller individuals distributed in shallower waters (<400 m) and larger individuals in deeper (>500 m) (Madurell et al., 2004). This may indicate ontogenetic migrations of the species toward deep waters (Moranta et al., 1998; Labropoulou & Papaconstantinou, 2000; Madurell et al., 2004). It has a wide distribution from the Mediterranean northward to southern Norway and across to the Shetlands, the Faroes, off southern Iceland and south-eastern Greenland (Whitehead et al., 1984; Froese & Pauly, 2006). Hollowsnout grenadier is also known from the Mediterranean coasts of Turkey (Bilecenoglu et al., 2002).

The community structure (Moranta et al., 1998; Labropoulou & Papaconstantinou, 2000; Madurell et al., 2004), and age and growth (Massuti et al., 1995; D'Onghia et al., 2000; Filiz et al., 2006) of the species in the Mediterranean were studied by various researchers. Length-weight relationships for this species are given by Diaz et al. (2000), Borges et al. (2003), Morey et al. (2003), Filiz & Bilge (2004), and Filiz et al. (2006).

In the Aegean Sea, the hollowsnout grenadier is being caught by commercial trawlers targeting deep-water shrimps. This paper provides the first information on the feeding activity of the hollowsnout grenadier for Turkish waters.

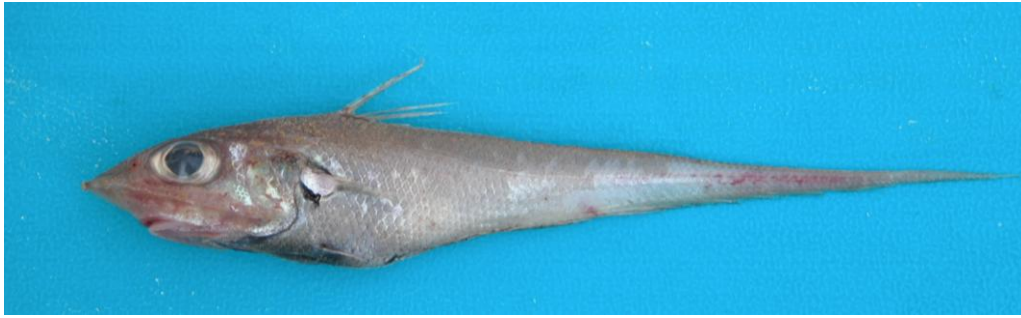


Figure 1. Hollowsnout Grenadier, *Caelorinchus caelorhincus* (Risso, 1810)

Material and Methods

Samples were collected during 2003-2004 in seasonally intervals at Sığacık Bay (Fig. 2) onboard the F/V Kuruca Hapuloğlu by using a conventional bottom trawl with a cod-end mesh size of 24 mm. Depth range of the fishing ground was 150–473 m. Notwithstanding a total of 411 specimens of *C. caelorinchus* were collected during bottom trawling excursions carried out in March, July and November 2003 and January 2004, 148 specimens ranging from 113 to 123 mm in total length (TL) were analyzed for the diet composition of the species. .

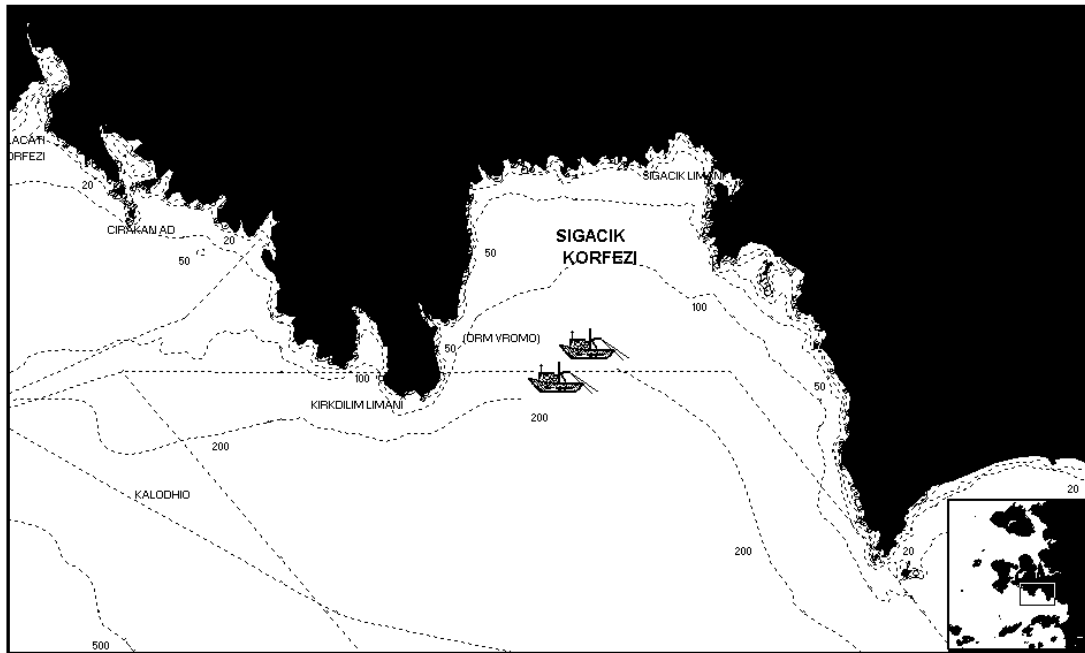


Figure 2. Study area



The stomachs were individually preserved in 4% buffered formalin for 24 hours, stored in 70% ethanol in marked containers, and analyzed over some months. Prey items in each stomach were, whenever possible, identified to species level, measured, counted and weighed on an electronic balance (precision 0.001 g).

Diet Analysis

Diet composition was evaluated using three measures described by Hyslop (1980): the numerical index (%N); the gravimetric index (%W), and frequency of occurrence (%O). Based on Cortes' (1997) suggestion, the index of relative importance (IRI) was calculated and expressed as a percentage (%IRI).

Consequently, food items were grouped into categories of preference using the method proposed by Morato *et al.* (1998). The categories were measured according to the equations:

$IRI \geq 30 * (0.15 * \sum \%O)$	- main important prey (MIP)
$30 * (0.15 * \sum \%O) > IRI > 10 * (0.05 * \sum \%O)$	- secondary prey (SP)
$IRI \leq 10 * (0.05 * \sum \%O)$	- occasional prey (OP)

Results

Diet Composition

Of the 148 hollowsnout grenadier stomachs examined, 146 had food (98.6%) and 2 were empty (1.4%).

Crustaceans were found to be most important prey groups (MIP; $IRI \geq 1196$) in the diet. Polychaetes constituted the secondary prey groups (SP; $1196 > IRI > 133$), while Chaetognathans were an occasional prey group (OP; $IRI \leq 133$). Crustaceans constituted of 98.42% of the diet, however, Polychaetes and Chaetognathans composed of 1.51% and 0.07% of the diet, respectively (Table 1).

Several studies of the diet of this species have been carried out in the north-west Atlantic (Longton & Bowman, 1980) and in the Mediterranean (Macpherson, 1979; Macpherson, 1981; Madurell & Cartes, 2006). Conversely to our finding, the general impression of the previous studies is that hollowsnout grenadier mostly feeds on polychaetes. Macpherson (1979) reported that diet was constituted of 48.3% polychaetes, 31.5% crustaceans and 20.2% amphipods, gravimetrically. Longton & Bowman (1980) found detritus (36.6%), polychaetes (35.8%) and crustaceans (27.6%) in the diet. Macpherson (1981) recorded that polychaetes (62.7%) and crustaceans (37.3%) occur in diet. Finally, Madurell & Cartes (2006) stated that polychaetes (58.12% IRI) were the dominant prey for this species, followed by amphipods (19.13% IRI) and copepods (14.42% IRI).



Items	%N	%W	%O	IRI	%IRI
Polychaeta	1.93	7.31	26.03	240.49	1.51
Crustacea				15651.94	98.42
Copepoda	74.71	45.54	89.04	10706.94	67.32
Mysidacea	1.93	2.80	23.29	110.19	0.69
Amphipoda	0.23	2.05	4.11	9.36	0.06
Isopoda					
<i>Gnathia vorax</i>	0.54	1.08	9.59	15.50	0.10
Euphausiacea	0.54	9.28	2.75	26.92	0.17
Decapoda	18.87	30.95	95.89	4777.25	30.04
Brachyura	0.39	0.67	5.48	5.78	0.04
Chaetognatha					
Sagitta spp.	0.85	0.34	9.59	11.38	0.07
Total	100.00	100.00	265.75	15903.81	100.00

Table 1. Percent number (%N), percent weight (%W), frequency of occurrence (%O), Index of Relative Importance (IRI) and percent Index of Relative Importance (%IRI) calculated for each prey item found in the hollowsnout grenadier *C. caelorhincus*.

Copepoda	%N	%O	%W	IRI	%IRI
Calanoida	11.70	53.85	3.01	791.87	7.22
<i>Nannocalanus minor</i>	0.21	1.54	0.31	0.80	0.01
<i>Calanus gracilis</i>	0.31	1.54	0.52	1.28	0.01
<i>Clausocalanus arcuicornis</i>	0.10	1.54	3.36	5.33	0.05
<i>Clausocalanus</i> sp.	0.21	3.08	0.47	2.10	0.02
<i>Temora stylifera</i>	1.24	9.23	0.72	18.11	0.17
<i>Scolecithrix bradyi</i>	0.31	1.54	1.13	2.22	0.02
<i>Aetideus armatus</i>	80.54	92.31	27.11	9937.02	90.58
<i>Pleuromamma abdominalis</i>	0.21	3.08	4.04	13.06	0.12
<i>Pleuromamma gracilis</i>	0.10	1.54	0.20	0.47	0.00
<i>Lucicutia flavicornis</i>	0.10	1.54	0.31	0.64	0.01
<i>Candacia aethiopica</i>	0.10	1.54	1.29	2.14	0.02
<i>Candacia armata</i>	0.93	12.31	1.26	26.95	0.25
<i>Candacia bispinosa</i>	0.10	1.54	0.76	1.32	0.01
<i>Candacia simplex</i>	0.41	6.15	0.56	5.97	0.05
<i>Candacia</i> sp.	0.21	3.08	0.37	1.79	0.02
<i>Acartia clausi</i>	0.10	1.54	0.61	1.10	0.01
<i>Acartia</i> sp.	0.10	1.54	52.47	80.88	0.74
Cyclopoida	0.21	3.08	0.38	1.82	0.02
<i>Oncaea media</i>	0.10	1.54	0.59	1.07	0.01
<i>Corycaeus typicus</i>	2.69	23.08	0.53	74.31	0.68

Table 2. Percent number (%N), percent weight (%W), frequency of occurrence (%O), Index of Relative Importance (IRI) and percent Index of Relative Importance (%IRI) calculated for Copepods found in the stomach contents of hollowsnout grenadier, *C. caelorhincus*.



Discussion

The hollowsnout grenadier showed very diverse diets, mainly based on benthic (i.e. amphipods, decapod crustaceans, polychaetes, isopods, euphausiaceans, brachyurans and mysidaceans) and pelagic (i.e. polychaetes and chaetognathans) preys. Macrourids are characteristically described as generalist feeders, with widely diversified diets (Macpherson 1979; Mauchline & Gordon 1984). This probably constitutes an adaptive advantage in the deep-water environments of low productivity inhabited by macrourids (Madurell & Cartes, 2006).

Although hollowsnout grenadier feed mainly benthic organisms, copepods constituted of 67.32 % of the diet are pelagic (Table 2). Consequently, it is obvious that this species feeds on both benthic and pelagic preys. However, Madurell & Cartes (2006) claimed the hollowsnout grenadier showed an absence of fullness peaks and empty stomachs, probably related to predation on more benthic, low moving organisms.

The mouth's shape of hollowsnout grenadier has effect on its feeding. It has an inferior mouth and may forage on slow moving preys with the snout orientated to the substrate (Madurell & Cartes, 2006). Madurell & Cartes (2006) claimed that hollowsnout grenadier probably uses the rostrum to root in the sediment since they preyed on infaunal organisms like polychaetes. Thus, occurrence of the sediment burying preys (like polychaetes, isopods, euphausiaceans and amphipods) in the diet may support this thesis.



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INVESTIGATION OF MICROBIOLOGICAL POLLUTION OF SEA WATER IN MERSIN

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In this work, physical and microbiological analyses of the samples taken from the various parts of the sea, on the cost line in Mersin were carried out periodically.

It is a known fact that any effluent discharged into the environment will eventually find its way into a water body (River/Sea). Another major contributor to coastal and marine pollution will be untreated effluents discharged from industrial establishments.

Coast of Mersin has many second flats. Therefore, domestic wastes are discharged directly into municipal wastewaters. The sea is not suitable for swimming.

pH, salinity, Total Dissolved Solid (TDS) and temperature were measured to determine the physical parameters of the sea water samples. Fecal and total coliform and total microorganisms were counted to determine the microbiological parameters as well.

According to our results, it was found that the physical composition and microbiological activity of the sea water were changed as based on seasonal variations and the outer effects.

Key Words: *Sea water, microbiological pollution, coliform, sea pollution, Mersin*

INTRODUCTION

The importance of transportation between countries and continents were developed by globalization, because of sea transportations being economic makes it attractive but it causes a lot of problems.

One of the most important problems about sea transportation is sea pollution. Nowadays the sea pollution is not only a threat for the shipping countries but also for the world. The pollution from sea transportation and transportation have 20% of total sea pollution.

Against it's being illegal, to wash grease (ballast) tank, discharging (sintine) water to sea and discharging wastes to sea cause to develop the problems in passenger ships. Because of this kind of operation and discharging the petroleum in to sea, approximately 1 million ton/year amount, is an important threat for the world.

GESAMP (United Nations Group of Experts on the Scientific Aspects of Marine Pollution) is the group of Professional sea pollution[1,2].

The UK group of Professional sea pollution describes sea pollution as follows;

Pollution; a giving harm to source of organisms, to health of people and preventing fishing and sea operations, affecting the quality of sea or reducing the energy and value of sea directly or indirectly by human. [1]

Sea pollution, is originated from the result of loading treatments and polluting materials or sails[3].



The sea pollution from ship transportation causes those materials;

- Petroleum products
- Radioactive materials
- Toxic liquid materials e.d.
- Harmful materials transport by tanks, containers, railway cars or parcels
- Sintines, bolests
- Domestic wastewater from ship (toilet, washbasin, shower and water from kitchen)
- The rubbish of ship.

1.1. Sea Water Transportation

The pollution from ship transportation has 2 type.

- 1- The wastewater of ship/ phoseptics
- 2- The petroleum product from tankers.

1.1.1. Ship Phoseptics

That is a problem about all water vehicles. Generally, it is discharging directly like domestic wastewater so it causes water pollution. If the Marine did not prevent this threat, it would have caused important problems. [4]

1.1.2. The Reason of Mediterranean Pollution

Sea transportation, the petroleum refinery of Mersin, two petroleum trump terminal in Iskenderun gulf are important factors of pollution. The rate of pollution in Mediterranean is less than Marmara and Ege sea[5].

The factors of water pollution from domestic wastewater and industrial wastewaters of treatment in our country.

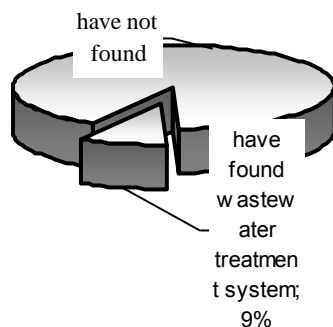


Figure 1: Existing of wastewater treatment plant of industry

- The industries having treatment units; 9% (figure 1).



- The industries which don't have from public company 84% and others 16% (figure 2)
- In Turkey, the organized industry areas operating process which have treatment system 14% (figure 3).
- The rate of not having the treatment system touristic establishment of Turkey is 81%.
- Turkey has 3215 municipalities and 141 of them have canalization systems but, only 43 of them have treatment establishment. Another perspective; 98.67 % of the sewerage is discharging without treatment to lake, sea and river.

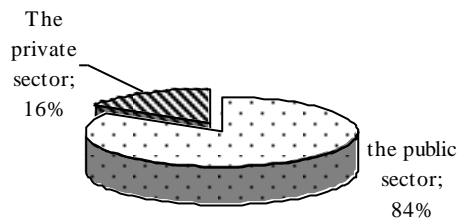


Figure 2: Ratio of public and private sectors in without wastewater treatment systems

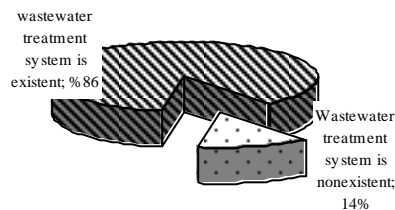


Figure 3: Ratio of found wastewater treatment system is organized industry areas in Turkey

- In Turkey 98% of industry establishment not have any treatment system, which have no function.
- The toxic and heavy metals from industry's wastewater. For a year 930 million m³ industrial wastewater of %22 can be treated, the other part of %78 is without treatment and discharging directly to rivers, lakes and seas.
- Polluted water, includes pathogen microorganisms which gives harm to health of people. If the polluted water mixes to drinking water, agricultural water. It can cause typhoid fever, dysentery, jaundice and cholera. Because of this; drinking water and water which is using from human must be controlled, the reason of polluting must be finished and disinfection have done.



1.2. Generally compound of sea water

Sea water includes the soluted elements of which existing from earth. Because of this, seawater has the soluble solid and gas, soluble organic composed, organic and inorganic fractions, suspended were had by sea water.[5,6]

The reason soluble and suspended materials in sea water; the relationship between oceans, atmosphere and Landscape.[5,6]

Generally;

- 1) Soluble organic materials.
- 2) Soluble inorganic materials.
- 3) Soluble atmospheric gases.
- 4) Suspended solid fractions.

Parameter	value
pH	6.0 – 9.0
Turbidity	natural
Floated matter	non
Suspended solid Matter (mg/l)	30
Soluble oxygen (mg/l)	Satiation is %90 too much
Raw petroleum and petroleum derivatives (mg/l)	0.003
Radioactivity	non
Productivity	
toxic	non
phenol (mg/l)	0.001
Cu (mg/l)	0.01
Cd (mg/l)	0.01
Cr (mg/l)	0.1
Pb(mg/l)	0.1
Ni (mg/l)	0.1
Zn (mg/l)	0.1
Hg (mg/l)	0.004
As (mg/l)	0.1
NH ₃ (mg/l)	0.02

Table 1. Sea water general properties [7]



1.3.Factors for compound of sea water effective

The oceans and seas which have high volume and square, can be effected by some physical, chemical and biological factors on to the compound of sea water.

Generally;

- Connection between oceans and atmosphere
- The level of solution for some materials.
- Reducing of an erobic bacteries.
- The solution and compose of salts.
- The effects of fresh water.
- Biological factors.

Those effective factors for seawater can be categorized by physical chemical and biochemical factors.

1.3.1.Physical Factors

The rate of salt compound for an area dependson evaporation and rain. Because of this, the rate of salt for subtropical areas so high. [5,6]

The elements can be transported by flow in wave and sea. So, some kind of surface waters are special about their physica-chemical factors. [5,6]

1.3.2. Chemical Factors

The elements in sea water can connect with different kind of elements and produce new reactions. Generally the amount of element at beginning time is equal at the bottom.

1.3.3. Bio-chemical Factors

The vegetal and animal organizms have an important role on to the compound of sea water vegetal forms, can change the rate of CO₂ and O₂ on to the photosynthesis and respiration. Bottom waters are poor about O₂ from respiration and oxidation. [5,6]

Active elements for bio-chemical circulation; C:P:N obtain from water for the growing period of vegetals and also can given to water by waste product or the separation at organic materials.

However the rate of organic sediments at the bottom of sea is so less. But sometimes it can be used such as a food for the bottom animals. [5,6]

1.4. Sea Discharging Systems

The sea discharging system of wastewater can sparsing by the receivers, is accepted and operated. Specially open sea, because they have a big capacity of assimilation so that's an advantage for discharging of sea, because of this deep sea discharging systems is a useful wastewater treatment system.

Sea Discharging systems, with a simple definition.



1.5. Bacteriological parameteres and Definitions

Coliform bacteria = The digestion system of human and animal agricultural bacteries.

Total coliform = Generally, total canalition and agricultural bacterioligcal pollution.

Fecal coliform = Directly, digestion system of human and animals, they it means for the last 8 days pollution.

Fecal Streptococ= Generally origin is the digestion system, a symbol of new pollution. It means for the 6 days pollution.

The rate of Fecal Coliform and Fecal streptococ= That's a useful tool for understanding the origin of pollution, from human or animal.

The analysis of fecal streptococ species= To analysis the origin of pollution from which animal.

1.6. *The invention of Fecal Coliforms in sea*

They are the parameter of sewerage. Specially for drinking water and recreasyon areas, the rate of organism is important for the health of human. The quality of health for the coasts of sea[10].

2. Material and Method

2.1. *Material*

- For total coliform counting to endo agar at 35 C° and 2 days for incubasyon (Elektra-Mag 6040 BP).
- For fecal coliform counting to endo agar, at 44.5 C° and 2 days incubasiyon (VELP Scientifica FTC 90E).
- For total microorganism counting to agar at 25 C° 5 days incubasyon. (SANYO inkübatör).
- For physical specifity of water, conductometer and pH meter. (Hana 8521).

2.2. *Chemical materials and expenditure materials.*

- Steril column
- Steril
- %10 Na₂S₂O₃
- Endo agar (Fecal Coliform and total coliform)
- Plate count agar (to for total microorganism)
- 1ml sample was tosken and mixed with 9 ml fresh water, mixed by vortex. For each sample 1 ml to 10⁻⁵ diluted.



2.3. Method

2.3.1. Collecting and protecting of the samples

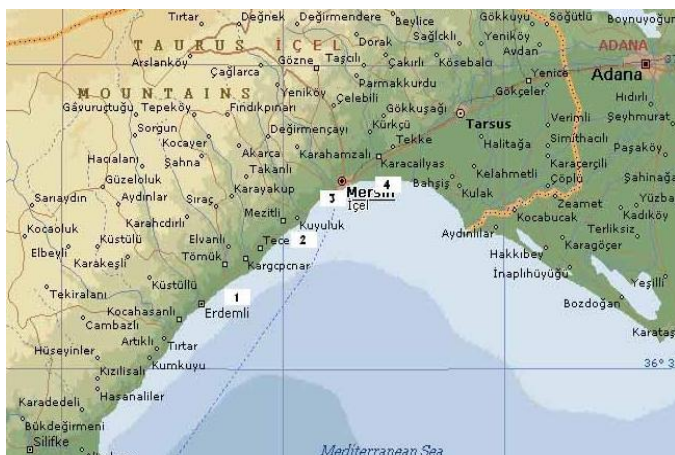


Figure 4: Sample points at Mersin Map

Samples were taken from the coast of Mersin city (figure 4). They are:

- Tömük
- Mezitli
- Pozcu
- Liman

Water samples were taken 300ml by clean glass and with screw cover lid bottles. The rate of salt is more than 15 mg 11 so that's necessary to add 0,1 ml %10 $\text{Na}_2\text{S}_2\text{O}_3$ teh bottles which are closed lid put at the bottom of water and than the lid was opened for fulling. Sampling was made from lower of surface (25-30 cm). sampling bottle organized for mixing such as air emptiness. Samples were stored under 10°C and analysis before 6 h.

2.3.2. Inoculation for microorganism analysis of samples

For counting fecal and total coliform, diluted solution was used prepared between 10^{-1} - 10^{-5} . sowing was made by spreading number plate method with 10^{-1} - 10^{-3} - 10^{-5} sporsing value. According to the method 0,1 ml sample made by L sample [8].

For total microorganism counting the diluted value 10^{-1} , 10^{-3} , 10^{-5} sparsing value with 1 ml sample was taken. According to the method on optimum conditions 1 ml sample, steril petri was taken on to it and added sooled plate count agar to 40 - 50°C [8].



3. Discussion

The reason of sea pollution; domestic wastewater, industrial wastewater and sea transporting. They can threat the life system of flore and fauna in sea. The coast of sea was not used carefully so it can cause some health problems.

Sea is an ecosystem that can easily renew itself. Because of domestic pollution and other non-optimal conditions sea can lose ağabeylity of renewing. Renewing needs time. Especially petroleum layer can prevent UV and O₂ connection between photosynthetic organism.

Domestic and industrial wastewaters have organic loading capacity if they were given without pre-treatment to sea, and deep sea discharging controlling regulation didn't care on,. It can cause organic loading pollution.

That's necessary to reducing organic loading rate by standarts and before discharging the organic loading is a disadvantage for sea ecosystem.

If the water does not suitable conditions, the color is not normal. Turbidity is an estetecal problem and it's not healthy.

Coliform bacterias are the parameters of water pollution. That's a parameter for domestic wastewater. Because of this, parameters for pollution; total coliform, fecal coliform and total microorganism counting.

The reasons for reducing and increasing have some kind of factors. The results of all experiments show that pH was increased by time. Aproxmately investigation took 4 months. If we want to see the seasonal factors onto the experiments we should stay or investigate 1 year. The reason of pH changing is the non-stability of season during the investigation (figure 5).

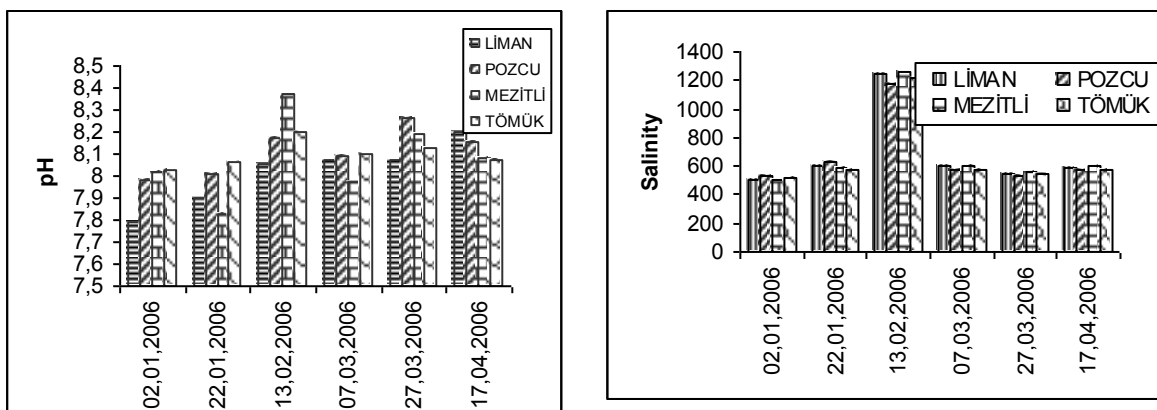
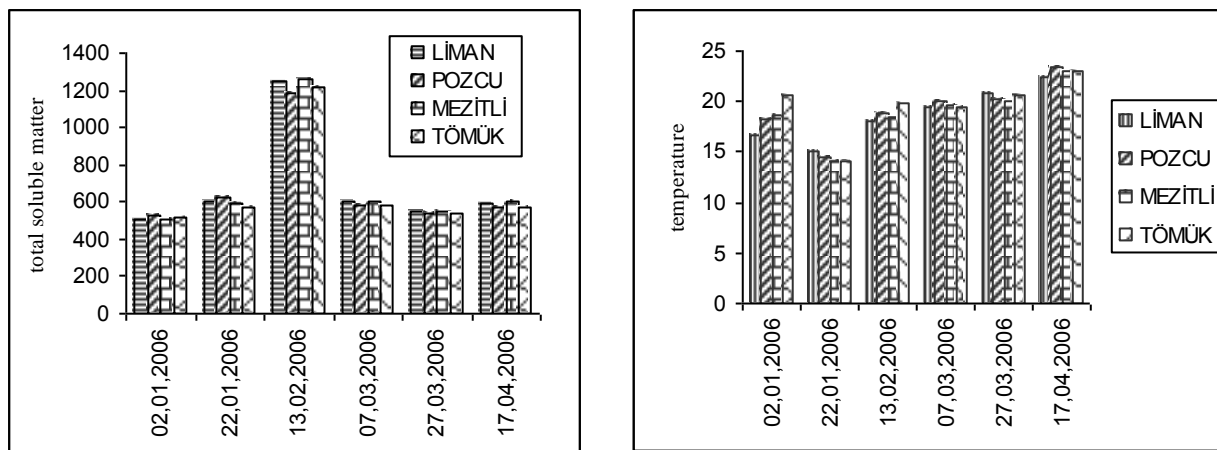


Figure 5: The change of pH and salinity value during period



Conductivity has similar changing like pH. Conductivity is related with the concentration of the ions in the water. Conductivity is connected with mineralization, flora and fauna, chorozotion velocity. When the heat is high conductivity is high. Total soluble material has similar condition like heat (figure 5). The rate of salinity can be shown low but that's normal



rate of sea water (figure 5). Low rate of salinity is depend on to the rains.

Figure 6: The change of total soluble matter concentration and temperature value during period

Samples were diluted with 1/100 rate. Total soluble material was increased on 13.02.2006. the reason of increasing was the waves of sea and hanged solid materials (figure 6) and also during this period the rate of rain was increased teh heat of sea water was increased according to the season norms (figure 6). The charging of heat effects other physical parameters.

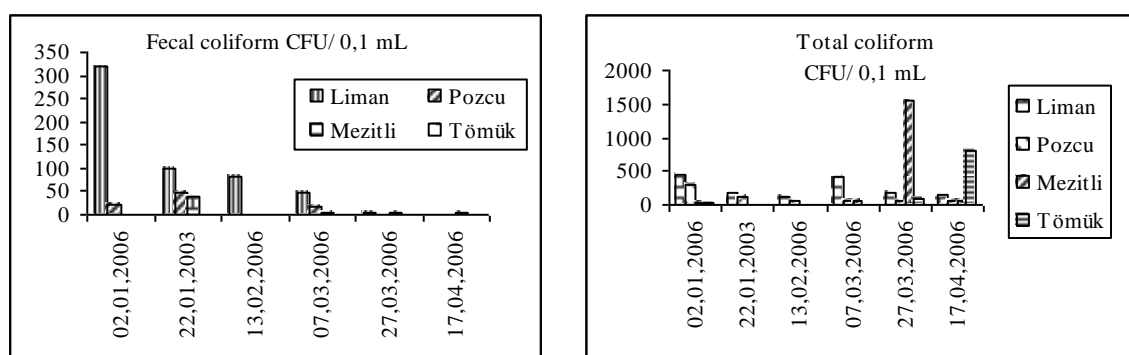


Figure 7: The change of fecal coliform and total coliform concentration during period

On 02.01.2006 date of experiment shows; the amount of fecal coliform 320 in Liman area. That result is higher than sea standarts. According to the analysis of 22 January, 13 February, 07 March and 27 March 2006 show, that, fecal coliforms. But 1 April 2006 date of experiment doesn't have any fecal coliform. The reason of that problem is, discharging the domestic wastewater and the wastewater of ship to sea. Limon area is without wave like an inlet.



Circulation is too slow. The variation of fecal coliform depends on only human factor. When the ship traffic is high the rate of fecal coliform is high (figure 7).

In Pozcu area, the experiments on 02 and 22 January and 07 March 2006 were showed that the amount of fecal coliform is higher than standards. But on 13 February, 27 March and 17 April showed that the amount of fecal coliform is lower than season standards. The reasons can be effected from seasonal variation, rain, wave and storm. Especially the rate of coliforms are in winter more than during the summer (figure 7).

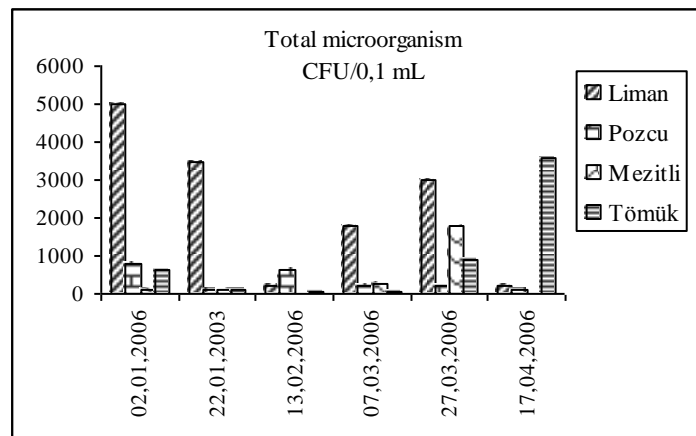


Figure 8: The change of total microorganism concentration during period

The rate of fecal coliform in Limon area is higher than Pozcu area.

In meztli area, the experiments on 22 January, 27 March and 17 April were showed that the amount of fecal coliform is equal, but when the date was 02 January, 13 February and 07 March the amount of fecal coliform was lower than standards. The reason of that problem; human factor and habitat when we looked the graphic of fecal coliform -time, that's obvious. When coliform fecal is high, the heat is low (figure 8).

Lake and fresh waters have sedimentation during the summer and winter. But that is different in sea area.

Generally in sea ecosystem com ego operating, some physical specifity of sea and heat of water cause, some difference between fresh water ecosystem. Because of this some m,crobial specifity can change [9]. According to the results; the variation of microorganisms to sea's physical specifification and but also anthropogenic factors have an important effect.



In Tömük area, all the amount of fecal coliform was less than standards. That area is special for only summer. Because of this, the rate of domestic wastewater is less and industrial wastewater is non-existent. Because of this the microbiology of sea ecosystem is not effected from outside factors (figure 7). When we analysed those 4 area from Limon area to Tömük area the amount of fecal coliform is going on less. But total coliform rate is higher than standards. In Mezitli area 27 March, Tömük area 27 March and 17 April, experiments show that, total coliform amount is increasing (figure 7).

According to the 4 experiment area's arithmetic average results show that the amount of fecal coliform is reducing. That reducing can be from increasing of heat because the optimum generation heat can effect (figure 7).

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COASTAL ZONE MANAGEMENT

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The coastal zone is a transition area that includes both the area of the sea subject to land influences and the area of land subject to marine influences. The coastal zones are intensively used for various purposes as fishing, tourism, water supply, aquaculture, etc. by human. Furthermore, they are also the most populated and have been industrialised areas of the world. The coastal areas of the world are exposed the various pressures from rapid urbanization, increasing population and industrial development. The coastal area water quality concerns include litter from ships, sewage and waste, petroleum, sedimentation, fertilizers and pesticides and nutrient inputs. The management of the coastal zone requires integrated and multidisciplinary effort.

Keywords: *Coastal zone, management, pollution, estuary, bay, integrated coastal zone management.*

1. INTRODUCTION

The coastal zone is a vital transition area between land and sea that is affected by both terrestrial and oceanic forces (1). With the other definition, coastal zone is divided three main components as the sea, the beach, and the land behind beach (2). Coastal zones are areas of dynamic water movement that integrate various modes of water movement. Fresh water flows into coastal zones via rivers and groundwater tidal flows, waves, and the unique physical properties of saline water create complex and fragile balance coastal zone ecology (1).

Although the coastal regions narrow zone, they contain some of the planet's most productive ecosystems with rich biodiversity reserves (2). For example, estuaries are among the most productive marine ecosystems in the world and are critical to the life history and development of many aquatic species (3). Nutrient inputs from the land, relatively warm waters, and abundant light stimulate these high levels of productivity, the base of the food web. Both coastal waters and lands provide uniquely productive habitats, such as estuaries, coral reefs, mangrove forests and other coastal wetlands, and seagrass beds (4).

Due to unique ecological characteristics, the coastal zones intensively are used by human. Human uses of coastal areas are fishing, tourism and recreational opportunities, aquaculture, conservation, potable drinking water supply, navigation, mining, construction, industry and urbanization uses (1). Moreover, coastal zones are also typically the most populated areas; more than two-thirds of the world population lives within 60 km of the coast and drive an high pressure on the environment with the production of wastes (solid, liquid and gaseous) and the exploitation of natural resources (1, 5, 6). The attraction of the coastal zones stems from its diversity of services. As coastal zone ecology has subjected to important stress, continuation of these services is in doubt (1). As a result of these stresses, undesirable effects as pollution of marine and freshwater resources, loss of marine and land resources, air pollution, the loss of cultural resources, loss of public access, soil degradation, and increasing levels of noise and congestion may occur (5).



Moreover, much of the world's waste ends up in the ocean. Domestic wastewater discharges, runoff from land-based activities, nutrients, metals, synthetic organic compounds, petroleum hydrocarbons, radioactive materials eventually flow into coastal waters. In some circumstances, atmospheric deposition may be the principal transport mechanism of pollutants to coastal waters. Thus, these pollutants and human activities of the coastal zone impact the richest and most productive areas of the ocean and reduce the capacity of coastal ecosystems to respond to stress (4).

Water quality management in the coastal zone has traditionally concentrated on inshore areas heavily populated and ecologically sensitive such as estuaries, bays and lagoons (1). Coastal zone management encompasses the concepts of integrated resource management and sustainable development (2). Integrated coastal zone management (ICZM) is generally recognised as the most effective tool for incorporating conservation and sustainable use of marine and coastal biodiversity aspects into the planning of coastal areas (7). It requires balancing a wide range of ecological, social, cultural, governance and economic considerations (2). Coastal zone management is intersectoral, therefore all of the countries must take precautionary measures.

2. ACTIVITIES IN THE COASTAL ZONE AND THEIR IMPACTS

Coastal zones are intensively used in human activities and as a result of these activities the ecology of coastal zones is degraded. The output of anthropogenic contaminants as a result of domestic, industrial and agricultural human activities, directly or via rivers, into coastal zone that consists of estuaries, bays and wetlands is consequently, steadily increasing (3, 8). The coastal zone the ultimate depository of most pollutants, whether they originate from the land or from the sea (2). Coastal pollution is threatening the health of mangroves, seagrass beds and coral reefs thus putting at risk the livelihoods of several communities (9).

The elements that caused coastal pollution is investigated into three categories: (1) physical components are urban wastes such as sludge, litter, (2) chemical components are organic and inorganic wastes such as industry, navigation, petroleum products, sewage, detergent, agricultural chemicals (herbicides, pesticides, fertilizers, etc.), nitrate, nitrite, ammonia, (3) biological components are infection agents such as fungus, bacteria, viruses (10).

2.1. Agricultural and aquacultural activities

Agricultural activities are one of the activities outside of the coastal zone and responsible for a significant amount of water quality problems related to coastal zones due to its association with herbicides, pesticides and fertilizers (1, 2). The pollution resulted in agricultural lands is a source that can't be controlled (11). Agricultural chemicals result in changes in the reef and seagrass communities, and in high concentrations may cause fish kills in areas of poor water circulation (2).



Aquaculture term means farming of animal or plant that lives in the water and it provides a third of total fisheries production (2, 12). Half of the total aquaculture yield comes from land-based ponds and water-based pens, cages, longlines and stakes in brackish water and marine habitats (12). But, it can also cause potentially serious environmental effects such as clearance of mangroves and other coastal vegetation for ponds, declining water quality caused by nutrient enrichment and oxygen depletion of outflowing water, and the introduction of non-native species, which may escape the aquacultural ponds and disrupt natural ecosystem functioning (2). Furthermore; it has socioeconomic impacts include such as privatization of public lands and waterways, loss of fisheries livelihoods, food insecurity, and urban migration (12). Therefore, sites and species used in aquaculture should be selected for their suitability in order to minimize impact on the environment (2).

2.2. Industrial activities

As the coastal zone provides ready sources of power, proximity to ports and important raw materials, it is a desirable location for many industries. The main industries that cause coastal zone water pollution are paper, chemical, petroleum and primary metals production (1, 13). The most important marine pollutants are mercury, cadmium, lead, copper and cyanide. Industrial wastes can also cause thermal pollution due to cooling waters from plants such as thermal and nuclear power generation (14).

2.3. Tourism

Tourism is considered one of the world's fastest growing industries and provides a positive contribution to the local economy (2, 9). It is based on natural and cultural attractions and resources, where the use of those resources is renewable (2). However, the tourism sector has also been a source of environmental degradation including that caused by untreated wastewater from hotels and restaurants, solid waste on many beaches, waste from tourism boats and ships (2, 8, 15). Other detrimental effects of tourism activities are the destruction of mangroves for development, which in turn causes siltation of coastal waters. Furthermore, oil leaks from boat engines and physical damage to the reef and seagrass bottoms caused by divers, snorkellers, and boat anchors also have a negative effect (2).

2.4. Urbanization

One of the most damaging ways the coastal zones is the discharge of wastewater and sewage. Many coastal cities discharge sewage directly into their surrounding seas. Worldwide, two-thirds of the sewage from urban areas is discharged untreated into lakes, rivers and coastal waters (16).

Leachate from inadequately lined landfills or dumps along the coast may carry large amounts of heavy metals, bacteria, insecticides, cleaning products, and other pollutants to coastal waters. These materials have serious consequences for human and coastal ecosystem health. Landfill leachate has been identified as a major source of PCB pollution in coastal areas (1).

Salt-water intrusion is one of the effects of urbanization and it results from overpumping of aquifers for domestic and industrial water use. Besides, urban run-off, by itself, is often sufficient to pollute coastal waters. Sources of the contamination are street litter, household refuse, automobile drippings, pet wastes, spillage from bulk chemical storage, and exposed dirt piles (1).



2.4. Oil wastes

Oil wastes are important pollutants that pollute seas and threat aquatic organisms (13). Oil spills are dramatic, visible and locally important. Despite enormous quantities of oil spilled onto coasts worldwide, however, spills represent a relatively minor concern compared with the more chronic problems. Wave action scours even badly coated shores, and migration from nearby shore areas enables biotic communities to recover relatively rapidly (1). Oil cause the decrease of light, the stick to living organisms, and it has toxic and carcinogenic effects (14).

2.5. Dredging, filling, dams and impoundments

Although dredging, filling, dams and impoundments have different goals, their effects on the coastal zone are similar in that each activity alters either flow of fresh water into the coastal zone or flushing action of tides and waves. Thus, they act to isolate coastal areas and increase the potential for concentration of pollutants (1). Sedimentation is also a common result of any construction activity and results in increased water turbidity which in turn decreases the productivity of coral reefs and seagrasses (1, 2). With high levels of sedimentation, physical smothering of corals and benthic organisms by sediments and fine silt may take place (2).

2.6. Global warming

Global warming may result in a substantial sea level rise with serious adverse effects in the coastal zone (17). Based on available evidence, the global mean sea levels are thought to have risen by approximately 10-20 cm during the last hundred years. The rise in sea level has not been uniform, and large variations exist between localities. Estimates of sea level rise due to current levels of greenhouse gas emissions predict an increase of 6 cm/decade (from a low estimate of 3 cm to a high estimate of 10 cm). This would mean an increase in sea level on the order of 20 cm by the year 2030, and approximately 65 cm by the year 2100 (2).

3. INTEGRATED COASTAL ZONE MANAGEMENT (ICZM)

Integrated coastal zone management (ICZM) has developed over the last several years as a major international initiative resulting from the 1992 United Nations Conference on Environment and Development. The concept is based on an attempt to develop a uniform management framework for a comprehensive approach to all the sectoral activities that affect the coastal zone. Integrated coastal zone management (ICZM) is defined as a governmental process and consists of the legal and institutional framework necessary to ensure that development and management plans for coastal areas are integrated with environmental and social goals and are made with the participation of those affected. ICZM has developed rapidly in the last few years due to a series of international initiatives. These include the Rio Declaration on Environment and Development, Agenda 21 and Chapter 17 on the Protection of Oceans (1992), UNCED Conventions on Biodiversity (1992) and Climate Change (1993), the Organization for Economic Cooperation and Development (OECD) recommendations integrated coastal zone management (1992), the Noordwijk Guidelines for ICZM (1993), the World Coast Conference (1993) and the Coastal Zone Canada Conferences on Cooperation in the Coastal Zone (1994 and 1996) (18).

Integrated coastal management is an approach that holds much promise for effective and efficient systematic management of the coastal environment. ICZM is an ecologically based, iterative process for identifying, at a regional scale, environmental objectives and cost-effective strategies for achieving them. It is illustrated process of integrated coastal zone management in Figure 1.

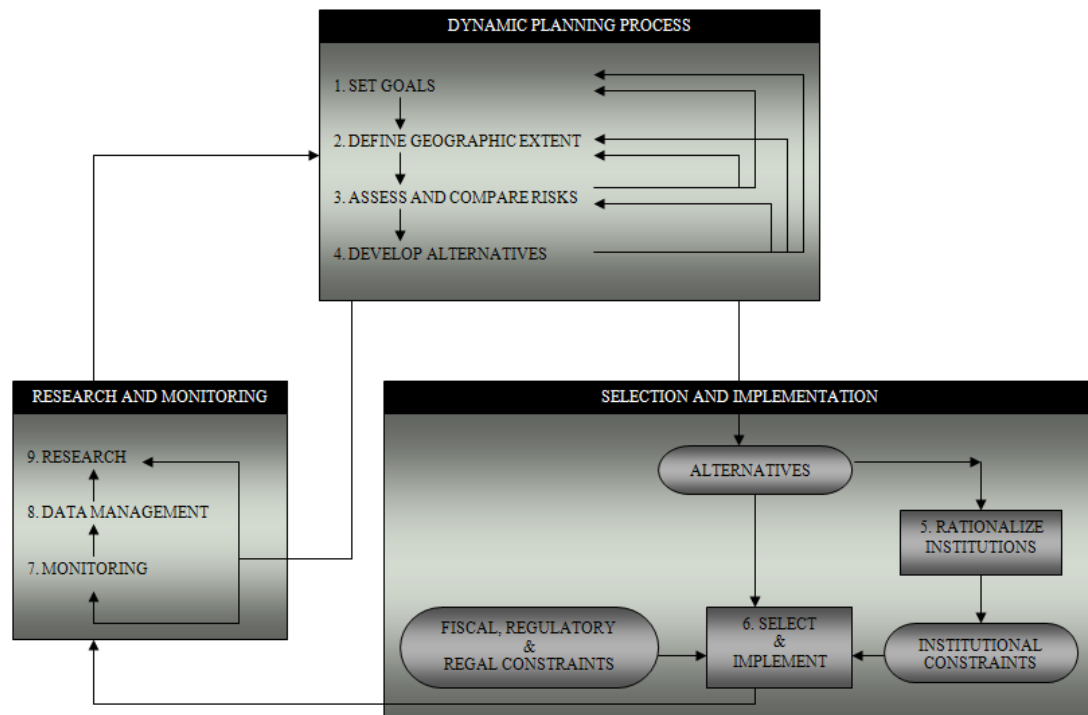
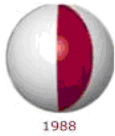


Figure 1. Process of integrated coastal zone management (ICZM) (19)

Through ICZM, environmental and human resources that require protection can be identified, the multitude of factors that may contribute to adverse impacts can be considered, and the relative importance of various impacts and contributors can be weighed. Integrated coastal management should provide the opportunity to consider regional differences, multiple sources of perturbations, costs, and benefits in the development of management strategies. The objectives of integrated coastal zone management are;

- to restore and maintain the ecological integrity of coastal ecosystems,
- to maintain important human values and uses associated with those resources (19).

The principles of integrated coastal zone management are;

- the coastal area is a unique resource system that requires special management and planning approaches,
- management actions are based on the best available scientific information about ecological functions, as well as a comprehensive understanding of human needs and expectations, which are both tangible and intangible,
- management objectives are expressed as water- and sediment- quality based, and other environmentally and health based goals,
- coastal management boundaries should be issue-based and adaptive,
- comparative assessment of both risk scenarios, and available management options drive the selection of management strategies,
- a major emphasis of coastal resources management is to conserve common property resources,
- prevention of damage from natural hazards and conservation of natural resources should be combined ICZM programmes,
- all levels of government within a country must be involved in coastal management and planning,



- a transdisciplinary perspective is critical to coastal problem solving,
- special forms of economics and social benefit evaluation and public participation are used in coastal management programmes,
- conservation for sustainable use is a major goal of coastal resources management,
- multiple-use management is appropriate for most coastal resource systems,
- multi-sector involvement is essential to sustainable use of coastal resources,
- traditional resource management should be respected,
- the environmental impact assessment approach is essential to effective coastal management,
- ICZM is driven by science and engineering together with public expectations (19, 20).

4. RESULTS

Coastal zones have a critical importance for humans. They contain unique and irreplaceable ecosystems. Therefore, coastal zones are subjected to various stresses. The factors such as litter from ships, boats or shore; sewage including pathogens and heavy metals; petroleum; sedimentation; fertilizers and pesticides; and nutrient inputs are common coastal area water quality concerns. As the coastal zone is a unique resource system, it requires special management and planning approaches. Integrated coastal zone management (ICZM) is needed to resolve the conflicting demands of society for products and services. With integrated coastal zone management, it is provided long-term and sustainable use of coastal resources without threatening its natural and sensitive ecosystem. Moreover, it can be obtained appropriate waste management strategies, and effective use of coastal zone for other activities can be provided.

Coastal zones should be delineated for fisheries, aquaculture, tourism and other uses through the process of integrated coastal zone management (ICZM). Allocation of activities to locations should be based on the carrying or assimilative capacity of the environment for a given use, protection of community resources, rehabilitation of degraded habitats, stakeholder needs and mechanisms for conflict resolution. ICZM is based on the concept of the ecological footprint which incorporates not only inputs such as feed and seed, but also outputs, e.g., effluent treatment (12).

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CONTAINER FORECASTING TO MACRO AND MICRO PROJECTION FOR FUTURE DEVELOPMENT AT PORT OF IZMIR

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Port of Izmir is one of the major container ports in Turkey, at the same time, is a city port. It is situated at Izmir Bay in Aegean Sea. The port area surrounded by city developing is limited. But it is known that a port requires the sufficient berth length and container storage area to conduct their functions. In the port of Izmir, the most important problem is determine both the optimum number of berths and container storage area required lengths to the handling and storage capacities in future. The present handling capacity of port can be determined according to existing cargo and ship statistics. For future extension of port , forecasting demand for port cargo and ship traffic must be realized by using statistics on the amount of import and export cargo, the volume of domestic trade, number of arrival ships at present day in the past .

The forecasting demand for port traffic is generally determined by applying the macro forecast method on the basis of socio-economic conditions and the micro forecast method on the characteristics of cargo and ship flows. Macroscopic forecast is based on the assumption that cargo volume handled by port reflects the economic and social activities in the port's hinterland. The cargo volume is estimated by using the relation of economical growth, population density, and Gross National Products (GNP) between the hinterland and nation. Future cargo demand of port provides the calculation of the number of container. Microscopic forecast is also based on analyzing numerically the time series on ship and container number. Both forecast methods produces the different container volumes to be evaluated at the stage of decision making.

In this study, the macro and micro projection methods are used to estimate the future volume of container cargo in Port of Izmir. The existing berths length and open container storage area, statistics on economic growth, population and GNP for the eight hinterland cities and nation are taken into account. The hinterland cities are connected by highway and railway connections to the port. The transportation distance, duration and cost of these cities to the Port of Izmir are rather advantageous with respect to the other ports. In macroscopic projection study, total handling cargo volume and break-bulk with container cargo volume to socio-economic and GNP are estimated. Microscopic projection also produce the number of ship and container for future by considering the linear, non-linear and multi regression methods.

In making the decision, the extreme values of the cargo volumes obtained from the micro and macro projection are considered as the optimistic and pessimistic scenario.

Keywords: *Container forecasting, macro-micro projection, port demand analysis, port feasibility, port planning, ship traffic*



INTRODUCTION

One important aspect of any port analysis is the determination of the actual and potential port hinterland, or the area served by port. Port hinterland studies are therefore required to determine the geographic area that is dependent on specific port facilities. Part of hinterland study consists of evaluation of the development in a socioeconomic activity that is likely to affect or be affected demand for port commerce. Port hinterlands and their economic activity may change with the time and are usually different for different commodities, or for physical forms of cargo such as containerized cargo.

Development plan based on transportation policy and the volume of trade in a country affects directly port development plan. The traffic capacity or volume of containers to be handled in a port is therefore related to the social and economical level of hinterland together with the variation in number of ship with the time.

Before forecasting the traffic in a port, the data for hinterland to be served and nation collected. They are;

- Population and growth rate
- GNP of the hinterland and nation
- Income growth of hinterland and nation
- Annual total volume of cargo arriving in the port
- Annual volume of containerized cargo and containers arriving in the port.

In this study, some statistics based on import and export cargo by the value, volume, type, characteristics form, and transportation systems and cargo on industrial, agricultural and service sectors are not considered because of collecting limited data.

These data are evaluated by using one of the forecasting techniques to be dealt with. Optimistic and pessimistic scenarios can be thought according to the data fluctuation with time.

FORECASTING PRINCIPLES

Determining a port hinterland, some factors such as equal transport cost, equal distance, equal time, inter-port analysis, and other competitive factors. The data required for such an analysis usually include:

- Information on origin and destination of goods to be transported;
- Import and export statistics;
- Transport costs, transport time and other transport requirements;
- Port direct and indirect costs; identification of competing ports and transport routes;
- Determination of port hinterland changes or dynamics;
- Population distribution and population characteristics such as income distribution, ethnic and cultural aspects, and growth rate;
- Analysis of feeder transport such as rail, road;
- Technological changes;
- Forecast of ship arrivals and ship technology used and expected to be used;
- Rate forecast for routes served; and
- Cargo flow and capacity.



These data should be analyzed by using the forecasting technique within the planning period of port. These techniques can be classified into three categories; *time series and projections*; trend extrapolation, pattern identification and probabilistic forecasting based on the series of historical data that are analyzed in various statistical ways to get information about future demand. When time and data are limited, the time series techniques are most suitable for short-term planning. *Model building and simulation*; this method includes dynamic models, cross-impact analysis, simulation projection, and input-output analysis. *Qualitative forecasting*; scenario, expert opinion methods and value forecasting are in the scope of this technique.

In this study, short term planning is considered because of time and data limited. However, time-series and projections are preferred as forecasting technique. Projections can be classified into two groups: macroscopic and microscopic projections. The outputs to obtain both projections are compared and the container traffic capacity of a port is determined.

PROJECTIONS

In this study, two projection methods realize the cargo demand analysis: Macro and micro projections.

Macroscopic Projection

Macroscopic projection aims to forecast the container demand of port in future by considering the economy, population and income growth rate of both nation and region. This determines the annual container demand depending on the socio-economical rate covering the population rate and income growth rate both in nation and region.

$$a = \frac{\frac{(a_p + a_s)_{HINTERLAND}}{100}}{\frac{(a_p + a_s)_{COUNTRY}}{100}}$$

where a_p is population growth rate and a_s is income growth rate.

Hinterland is the region considered as whole. But the data collected from region belongs to the cities situated in hinterland. Therefore, the regional data on economy and commodity is evaluated separately for each city. In macro projection, the expected number of containers calculated into two different ways; the total cargo and mixed cargo with containers (in ton). Each way considered requires the two different formulations from aspect of socio-economic factor and GNP. However, the expected container demand is then calculated as follows:



For the cargo in total cargo;

Socio-economic factor:
$$Q_{SPX} = \frac{1}{\sum (SP)} Q_{TO} SP_{HINTERLAND}$$

GNP:
$$Q_{SX} = \frac{GNP_{HINTERLAND}}{GNP_{COUNTRY}} Q_{TO} \left(1 + \frac{a_{COUNTRY}}{100} \right)^x$$

For the cargo in mixed cargo with containers;

Socio-economic factor:
$$Q_{KSPX} = \frac{1}{\sum (SP)} Q_{KO} SP_{HINTERLAND}$$

GNP :
$$Q_{KSX} = \frac{GNP_{HINTERLAND}}{GNP_{COUNTRY}} Q_{KO} \left(1 + \frac{a_{COUNTRY}}{100} \right)^x$$

where P and S are respectively population and GNP of each city and the expected tonnage of cargo are also coded respectively as Q_{SPX} (total cargo by socio-economic factor), Q_{SX} (total cargo by GNP), Q_{KSPX} (mixed cargo with containers by socio-economic factor) (mixed cargo with containers by GNP)

Projection

Trend extrapolation is often used when time and data limited. This method is most suitable for the forecasting of single or dependent variable. Like any time-series technique, it assumes that the container numbers, tonnage, ship numbers and economic properties of past will be carried unchanged into the future.

Trend extrapolation can be performed by using regression analysis of several functions such as linear, exponential, logarithmic, power and parabolic functions. The regression analysis yields coefficients fitting a curve to the pattern of dependent variable.

In this study, trends on container tonnage, TEU's of containers and number of ships varying the time are analyzed by using all functions fitted by the method of least squares. The regression analysis assuming exponential growth function is performed between the cross variables such as tonnage and TEU's of containers and number of ships.

Multiple regressions are also used to determine the relationship between number of TEU, ship with time, and whether the outputs calculated by using several functions are confidential.



DECISION MAKING

Different source yields the expected values of containers based on fundamentals of macro and micro projections. In making a decision about the design parameters required for developing a port in future, the several outputs are then compared.

In some cases, the expected values by time are determined by taking the average of output values obtained from the mentioned functions. However, multiple regressions are also used to determine the relationship between number of TEU, ship with time, and whether the outputs calculated by using several functions are confidential. Even if the correlation coefficients ensure for analyzing each function.

DEVELOPMENT AT PORT OF IZMIR

Data Collected

For macro projection, especially statistics on the population, GNP, income growth rate in national and regional scope and statistics on the total cargo, mixed cargo with container handled in Turkey and Izmir Port, import and export amounts of them must be collected as seen the following tables.

Population\Year	1990	1991	1992	1993	1994	1995	1996	1997
Turkey Population ('000 person)	56098	57064	57391	58812	59706	60614	61536	62510
Turkey Population Increment (%)		1.72	1.52	1.52	1.52	1.52	1.52	1.58
Aegean Region Population	7990515	8112361	8234207	8356053	8477898	8599744	8721590	8843436
Aegean Reg. Pop. Increment (%)		1.52	1.53	1.52	1.53	1.53	1.52	1.52

Tablo.1 Annual populations and their increase rate

Years	Turkey (10 ⁹ TL)	Aegean Region (10 ⁹ TL)	Turkey (%)	Aegean Region (%)
1990	84592	13771	9.4	8.4
1991	84887	13674	0.3	-.07
1992	90323	14631	6.4	7.0
1993	97677	15986	8.1	9.3
1994	91733	15743	-6.1	-1.5
1995	99028	16792	8.0	5.5
1996	106080	17936	7.1	6.8

Table.2 GNP values and income growth rate for hinterland and Turkey

City\Year	1990	1991	1992	1993	1994	1995	1996	1997
Afyon	739223	747561	755899	764237	772575	780913	789251	797589
Aydin	824816	835554	846291	857029	867767	878505	889242	899980
Denizli	750882	760220	769559	778897	788235	797573	806912	816250
Izmir	2694770	2754783	2814795	2874808	2934821	2994834	3054846	3114859
Kutahya	973314	981552	989789	998027	1006265	1014503	1022740	1030978
Manisa	1154418	1165503	1176589	1187674	1198759	1209844	1220930	1232015
Mugla	562809	573838	584867	595896	606924	617953	628982	640011
Usak	290283	293350	296418	299485	302552	305619	308687	311754

Table.3 Annual population for cities situated in hinterland of Izmir Port



City/Year	1990	1991	1992	1993	1994	1995	1996	1997
Afyon	4337	6570	10658	18652	35064	67107	132430	271073
Aydin	7547	11223	17855	31733	66025	129792	257937	464713
Denizli	6231	9749	17026	28640	57348	112433	218211	454005
Izmir	10950	16735	28443	48772	98516	189011	349719	665844
Kutahya	7403	10844	17905	32919	67136	126741	242610	415935
Manisa	8144	12163	22085	37404	68034	132920	265479	509854
Mugla	8818	13291	24188	41676	90748	171205	344589	621988
Usak	4846	7812	13079	23011	46512	93060	176668	330306

Table.4 Annual GNP values for cities situated in hinterland of Izmir Port (x000 TL)

Years	Turkey Export (Unload)	Turkey Export (Load)	Turkey Cabotage (Load+ Unload)	Turkey Total Cargo	Izmir Port Export (Unload)	Izmir Port Export (Load)	Izmir Port Cabotage (Load+ Unload)	Izmir Port Total Cargo
1990	41 467	14 877	39 362	95 886	14 311	9 697	10 586	34 595
1991	47 439	19 165	29 671	96 275	15 882	10 598	9 845	36 565
1992	47 127	20 510	31 964	99 601	15 882	11 141	10 239	37 263
1993	60 003	17 379	34 313	111 695	23 822	11 022	11 574	46 420

Table.5 Total cargo and annual mixed cargo with containers handled in Turkey's state ports (1000 tons)

For micro projection, the presented cargo statistics are also utilized in addition to the following table.

These data is evaluated separately both for macro and micro projections. Cities situated in Izmir Port hinterland are selected by the cargo origins arriving in port and transport connections to provide some advantages for user from aspect of time, economy and distance.

Years	Import Total Cargo	Export Total Cargo	Total Cargo	Mixed Cargo	Container	Total (Mixed+ Container)
1990	1 517	1 426	2 944	621	1 124	1 746
1991	1 299	1 894	3 194	697	1 309	2 007
1992	1 603	2 639	4 234	667	1 438	2 105
1993	2 432	2 574	5 056	986	1 959	2 946
1994	1 439	3 183	4 623	578	2 431	3 009
1995	1 932	2 899	4 831	543	2 793	3 337
1996	2 455	3 071	5 527	628	3 331	3 960
1997	2 619	3 304	5 923	548	3 765	4 313
1998	2 814	3 507	6 321	513	3 907	4 420

Table.6 Total cargo and annual mixed cargo with containers handled in Izmir State Port (1000 tons)



Year	No. of Ship Arrival	Total Tonnage	No. of Container, TEU
1991	1755	3194221	146334
1992	2078	4243130	164170
1993	2160	5056223	214341
1994	2263	4623143	275432
1995	2240	4831344	300794
1996	2553	5527375	345924
1997	2496	5923787	391696
1998	2583	6321957	400194
1999	2725	7184413	435970
2000	2757	8164470	464455

Table.7 Annual number of ships, total cargo and container numbers in Izmir Port

APPLYING PROJECTION TECHNIQUES

Macro Projection

According to the statistics in 1993, the populations of hinterland and TURKEY are respectively 8 356 053 persons and 58 812 000 persons. However, the GNP's of them are similarly in 1993, 15986×10^9 TL and 97677×10^9 TL. The socio-economical rate is calculated as 1.12. For 1993 base year, if the considered year is taken as X, the year to be used in calculation, x is equal to $x = X - 1993$. The functions to be used in macro projection method are as follows;

For the cargo in total cargo;

Socio-economic factor: $Q_{SPX} = (4738743.03) (1.0962)^{1.12x}$

GNP: $Q_{SX} = (17871200) (1.0962)^x$

For the cargo in mixed cargo with containers;

Socio-economic factor: $Q_{KSPX} = (1969444.5)(1.0962)^{1.12x}$

GNP : $Q_{KSX} = (7427216.32)(1.0962)^x$

Here, annual total cargo, Q_{TO} , is 11169500 Ton/year and annual total mixed cargo with containers, Q_{KO} , is 46420102 Ton/year in 1993 statistics.



Total cargo tonnage and mixed cargo with containers in yearly are expected by considering GNP and social-economical factors as seen in Table.8.

Years	Total Load (Ton/Year)		Container+ Mixed Load Traffic (Ton/Year)	
	Q _{SPX}	Q _{SX}	Q _{KSPX}	Q _{KSX}
2005	16284785	53806072	6768036	22361640
2010	27237254	85168751	11319976	35395874
2015	45556230	134812222	18933389	56027549
2020	76195731	213392059	31667314	88685090
2025	127442273	337774798	52965625	140378178
2030	213155418	534658199	88588422	222202320
2050	1668122138	3356388204	693279621	1394904721

Table.8 Expected total load and container+mixed cargo values of macro projection for Izmir Port

Micro Projection

In trend extrapolation of time-series analysis, the linear, exponential, logarithmic and power functions are utilized for $x=X-1991$. The functions are presented in Table.9a-9b for the annual tonnages and Table.10a-10b for the annual number of containers.

	Linear $Q = (A + Bx).10^3$ Ton / Year	Logarithmic $Q = (A + B \ln x).10^3$ Ton / Year	Exponential $Q = (Ae^{Bx}).10^3$ Ton / Year	Power $Q = (Ax^B).10^3$ Ton / Year
A	3427.519	3472.274	3627.301	3619.981
B	462.108	1589.407	0.08562	0.30255
R	0.9604	0.8878	0.9577	0.9095

Table.9a Relation between expected annual total tonnage by time and correlation coefficients

Years	Regression Statements (10^3 tons)			Expected Traffic (10^3 ton)
	$Q = A + Bx$	$Q = A + B \ln x$	$Q = Ae^{Bx}$	
2005	9897.031	7666.783	12027.177	9880.347
2010	12207.571	8152.159	18453.773	12572.703
2015	14518.111	8523.468	28314.353	15818.376
2020	16828.651	8824.251	43443.830	19930.448
2025	19139.191	9077.069	66657.585	25381.903
2030	21449.731	9295.138	102275.366	32894.905
2035	23760.271	9486.864	156925.135	43575.514
2040	26070.811	9657.366	240776.435	59119.602
2045	28381.351	9812.366	369435.796	82128.428
2050	30691.891	9953.114	599835.334	116592.669

Table.9b Expected annual cargo tonnages by micro projection for Izmir Port



	Linear $Q = (A + Bx)$ TEU	Logarithmic $Q = (A + B \ln x)$ TEU	Exponential $Q = (Ae^{Bx})$ TEU	Power $Q = (Ax^B)$ TEU
A	147870.746	13915.112	162862.467	154588.060
B	36902.279	136527.295	0.13060	0.49982
R	0.9921	0.9865	0.9689	0.9966

Table.10a Relation btw. expected annual total tonnage by time and correlation coeff's

Years	Regression Statements			Expected Traffic
	$Q = A + Bx$	$Q = A + B \ln x$	$Q = Ae^{Bx}$	
2005	664502.652	499454.471	1013643.033	695184.685
2010	849014.047	541147.401	1947508.386	980785.329
2015	1033525.442	573042.205	3741740.228	1408147.367
2020	1218036.837	598878.903	7188990.833	2110002.847
2025	1402548.232	620595.576	13812179.910	3340494.736
2030	1587059.627	639327.274	26537287.110	5587475.482
2035	1771571.022	655796.287	50985985.710	9788011.014
2040	1956082.417	670490.810	97979174.480	17742332.490
2045	2140593.812	683756.314	188208577.900	32909118.240
2050	2325105.207	695846.270	361604403.000	61933445.020

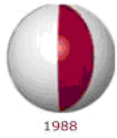
Table.10b Expected annual number of containers by micro projection for Izmir Port

On the other side, the number of container – number of ships relation and the tonnages of container and number of ships relation are separately derived by using the regression analysis.

The relation for number of container and ship : $y = 1587.9513e^{2.2531*10^{-3}x}$
The relation for tonnages of container and ship : $y = 14062.9647e^{2.5639*10^{-3}x}$

Year	Container Number and Ship Relation		Container Tonnage and Ship Relation	
	Container Number (TEU)	Ship Number	Container Load (Ton)	Ship Number
2005	695184.685	2699	9880347	2557
2010	980785.329	2852	12572703	2651
2015	1408147.367	3013	15818376	2740
2020	2110002.847	3192	19930448	2830
2025	3340494.736	3396	25381903	2925
2030	5587475.482	3624	32894905	3026
2035	9788011.014	3873	43575514	3135
2040	17742332.490	4137	59119602	3254
2045	32909118.240	4411	82128428	3383
2050	61933445.020	4692	116592669	3539

Table.11 The expected number of containers and tonnages versus number of ships



The expected number of containers and tonnage with number of ships are calculated by employing the mentioned formulas and are indicated in Table.11.

Multiple Regression Analysis

Multiple regression analysis are performed by considering the tonnage of container and number of ships with time (Table.12) and the number of container and number of ships with time (Table.13). The derived formula for container tonnage is expressed as;

$$Y = 1745.416894 + 4.692538122 \times 10^{-5} X_1 + 79.36994143 X_2$$

Here, the coded values are Y; number of ship, X_1 ; container tonnage and X_2 ; year

Similarly, for TEU,

$$Y = 1901.215095 + 3.408010338 \times 10^{-5} X_1 + 99.79691198 X_2$$

expression can be written.

N	Inputs of multiple regression			Expected Numbers		
	Ship Number Y	Container tons X_1 (Ton)	Years X_2 $X_2 = X - 1991$	Year	Container Tonnage	Ship Number
1	1755	3194221	0	2005	9880347	3320
2	2078	4243130	1	2010	12572703	3843
3	2160	5056223	2	2015	15818376	4393
4	2263	4623143	3	2020	19930448	4982
5	2240	4831344	4	2025	25381903	5635
6	2553	5527375	5	2030	32894905	6384
7	2496	5923787	6	2035	43575514	7282
8	2583	6321957	7	2040	59119602	8409
9	2725	7184413	8	2045	82128428	9885
10	2757	8164470	9	2050	116592669	11899

Table.12 Inputs of multiple regression, the expected container tonnage and no of ships

	Inputs of multiple regression			Expected Numbers		
	Ship Number \dot{Y}	Container no's X_1 (TEU)	Years X_2 $X_2 = X - 1991$	Year	Container Number	Ship Number
1	1755	146334	0	2005	695185	3322
2	2078	164170	1	2010	980785	3831
3	2160	214341	2	2015	1408147	4344
4	2263	300794	3	2020	2110003	4867
5	2240	275432	4	2025	3340495	5408
6	2553	391696	5	2030	5587475	5984
7	2496	345924	6	2035	9788011	6626
8	2583	400194	7	2040	17742332	7396
9	2725	435970	8	2045	32909118	8412
10	2757	464455	9	2050	61933445	9900

Table.13 Inputs of multiple regression, the expected number of containers and ships



CONCLUSION

Container statistics can be analyzed by using many complicated forecasting techniques. General groups of these techniques are time series and projections (trend extrapolation, pattern identification and probabilistic forecasting), model building and simulation, and (dynamic models, cross-impact analysis, simulation projection, and input-output analysis) and qualitative forecasting (scenario, expert opinion method and value forecasting). In this study, time series analysis especially covering trend extrapolation is carried out. Seasonal and residual variations of containers do not consider in the scope of this study. Some difficulties happened in collecting data required for more sensitive analysis. Even though at least 20-year statistics on the various type of cargo may be necessitated, for this study, the forecasting studies are achieved by using the limited time and data. Especially macro projection based on regional economic analysis and micro projection based on time series analysis are utilized.

A result of the case study on Izmir port, the container and mixed cargo forecasts yield the reasonable amount of container with respect to the results of the total loads forecasted by the macro projection. Multiple regressions and the relation giving the amount of mixed cargo plus container converge each other. In 2050 years, the number of containers forecasted shall be approximately 70 millions TEU. If a container is taken as 20 tons weighting, the number of containers can vary between 60-80 million TEU in 2050. Finally, the complicated process can be carried out by collecting the adequate data from aspect of time and content.

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FUTURE STORAGE AREA REQUIREMENTS FOR SUSTAINABILITY OF IZMIR CONTAINER PORT

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Inventory method is well known in management and econometric. But in port planning, it is rarely used because of yielding roughly the solution resulting from assuming average holding days of containers at yard and one-day data representing whole days in a month. In this study, the inventory model is utilized for future storage requirements of Izmir port. Especially in city ports, the size of storage area needed affects directly the city traffic and planning. This study gives the general information whether the size of storage area required for future extension of port is adequate for the allowed development area in land side of port. The exact solution can be found by using complicated mathematical modeling and simulation.

In this study, especially the inventory and cost model are processed for present values of container statistics. The similar process is maintained in order to determine the future storage area of Izmir port. Even though the limited data is analyzed, the reasonable solutions are obtained by assuming some parameters such as storage days and forecasting results. For three five-year planning terms, the inventory and cost model is utilized for future extension of storage area existing in Izmir port.

Keywords: *Container storage, container capacity, yard optimization, port planning, port feasibility, container traffic*

INTRODUCTION

Izmir city port is one of the major container ports in Turkey, where is located at Izmir Bay in Aegean Sea. The port area is limited since it is surrounded by the city. However, the demand for sufficient berth length and container storage area is essential for a port to conduct its functions. In Izmir port, the most important problem is to determine both the optimum number of berth lengths and container storage area required for handling and storage capacities in future. The present handling capacity of port can be determined according to existing cargo and ship statistics. For possible future expansion of the port, the demand for port cargo and ship traffic must be forecasted by using statistics based on the historical quantities of incoming and outgoing cargoes, the volume of domestic trade and number of arriving ships.

There are two important factors that affect port management which arise from regional and national planning. In this situation, port management is forced to carry out the required port activities in the limited area considered for future extension when the unexpected realisations happened due to urban development and when the target values estimated for the cargo volume and number of ships arriving at the port is exceeded because of the national trade and economical development.



Even though Port of Izmir has the limited extension area for future demand for container storage, it has to serve for the increasing number of container. The container storage area can be extended to 320 000 m². The problems arising from the limited storage area and the increasing cargo should be reconciled by determining the duration to be served by the well-equipped container storage area. In calculating the storage area, there are several approaches such as the conventional techniques based on the assumptions, UNCTAD graphics and inventory modeling which include the deterministic and probabilistic fundamentals. In this study, the size of storage area for container is calculated by considering the deterministic inventory theory and the Straddle Carrier system selected for container handling. For this, the required statistical data are the statistics regarding the number of container stored in a certain day of each month in a year and the holding duration of each container. Other parameters considered are the required storage area per TEU, number of container-holding day, annual amortization rate and income per TEU for handling and storing.

The aim of this study is to determine the optimum container storage area using the deterministic inventory model and port economy including the cost of service due to handling and storing and the cost of idle storage area. By minimizing the lost profit from lack of service for containers over the capacity and the cost of idle storage area from the amortization of investment, the optimum container capacity together with the optimum storage area including the certain stacking height of container is determined. This study is carried out for future extension of container area by considering the new data forecasts based on linear transformation of the monthly stored container values of the container forecasts from the macro and micro projections. Finally, the size of optimum storage area and the duration working with full storage capacity of port due to the limited extension area are determined by considering some assumptions in forecasting and modeling.

INVENTORY METHOD

The inventory method is one of the mathematical optimization methods. This aims to compute the number of idle slots and waiting container. By adding the cost analysis, the economical and physical optimization can be done. The determination of optimum size of storage areas plays an important role in port economy. For this aim, container terminals should be planned in accordance with the productivity of handling equipment, the optimum length of quays, and the prevention of idle storage areas

The container traffic variations affect the port economy, the size of storage area, the required handling equipment, berth capacity, port management and operations. A shortage in storage area may occur either by waiting containers before being served because of the container congestion due to insufficient stocking area or unserved and idle container slots which exist because of the excessive capacity of container storage area. Both cases cause a loss in container storage profit and the difficulty in paying the investment cost of idle slots. The optimization methods provide both the required area for storage by minimization of costs for waiting containers and idle slots for port management.

To optimize the container terminal storage yards, the principle of inventory method to be used as optimization method is based on developing a stochastic stock planning model, which is suitable for arrival and service distribution of containers. This model can be developed as deterministic and stochastic process.



The deterministic models suppose that the data on demand, capacity and unit costs (e.g. cost of invested area per square meters, cost of waiting container per day) are known. But this model is valid only if the statistics known. On the other hand, unknown data can be evaluated by stochastic inventory models introducing the probability distributions for the known data. For this reason, the stochastic inventory model can be developed by using the demand data represented by the tested probability distributions, capacity and unit costs.

In a container yard having a certain capacity, if an excessive demand exists surpassing the existing capacity of yard, the containers exceeding this capacity may not be served and the expected income of port management will be lost. On the contrary, the idle container slots will exist and so the profit as much as investment cost of idle slot will not be supplied. The total of both mentioned costs can be defined as the income loss of port. The aim of optimization with the inventory theory is to minimize the total cost from both cases and determine the optimal capacity of the yard. In this study based on minimizing the expenses from idle slots and unserved containers, any income from service and storage of container is taken into consideration.

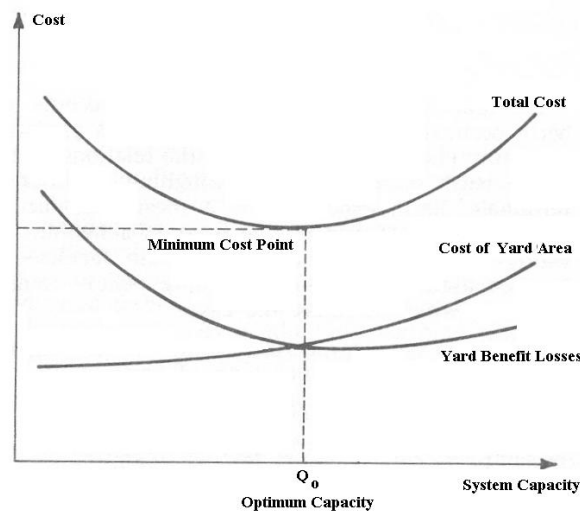


Figure.1 Container terminal stock yard capacity-cost function

As it is seen in Figure.1, considering variations on load demands on stock yard, sub structures cost will increase if it is built for an excessive demand. If the expected demand is not realized, a portion of the investment will be idle. In this case, the costs of vacancy will increase.

In other way, sizing the yard in a capacity which will not respond to the demand will also cause the decreasing of benefits, in other words, will cause increasing of the revenue losses. So the cost of vacant stock yard and profit loss must be balanced and the total must be as minimum.



INVENTORY MODEL OF CONTAINER YARD

In order to determine optimum capacity of yard, there are two most important factors: container numbers (in addition to their holding times) staying at stock yard of container terminals and stocking costs of containers at yard, Stock yard area, F , needed for holding times of containers, t_0 , to be dealt with later can be expressed as follows.

$$F = f_0 \cdot Q_s \cdot t_0 \quad (\text{m}^2)$$

where Q_s ; daily container capacity of terminal stock yard (TEU/day), and f_0 ; unit area per container box (m^2/TEU) by second (15 m^2), third (10 m^2) and fourth (7.5 m^2) level stacking.

Daily terminal stocking cost, C_{ss} , (USD/day), depending on terminal substructure, investment capital, interest rate and amortization factor is as follows:

$$C_{ss} = \frac{1}{365} C_{rf} \cdot C \cdot F \quad \text{or} \quad C_{ss} = \frac{1}{365} C_{rf} \cdot C \cdot f_0 \cdot Q_s \cdot t_0 \quad \text{and} \quad C_s = \frac{1}{365} C_{rf} \cdot C \cdot f_0$$

Here, C ; unit cost of yard (USD/m^2), C_{rf} ; annual amortization rate (0.111 USD/day) depending on r ; annual interest rate (%2), N ; life of investment (10 years) and then the unit cost of idle slots, C_s (0.300 USD/TEU.day) can be calculated.

Idle cost of container slots appears by considering unit cost of idle slots and their stocking days if $Q_s > Q_i$ and it is expressed as below.

$$t_o \cdot C_s \sum_{i=1}^S (Q_s - Q_i)$$

where Q_i shows the container numbers arriving in yard at time, i . If $Q_i > Q_s$, this means that number of containers arriving will be bigger than those to be allocated, so that profit lost on terminal stock yard appears and cost of unserved containers, resulting from delay in offering the service, is in the following.

$$C_b \sum_{i=S+1}^n (Q_i - Q_s)$$



Objective function to be defined by the total cost which contains the costs of idle slots and unserved containers, C , can be expressed as [11]:

$$C(Q_i, Q_s) = C_s \sum_{i=1}^S (Q_s - Q_i) \cdot t_i + C_b \sum_{i=S+1}^n (Q_i - Q_s)$$

where C_b is unit costs of unserved container composed of loading and unloading, terminal, warehousing and assisting trailer services (39.64 TEU/day). Obtaining holding day for each container makes difficulties so that average holding day, t_o , is taken instead of holding time t_i to be considered for each container capacity of yard, Q_i .

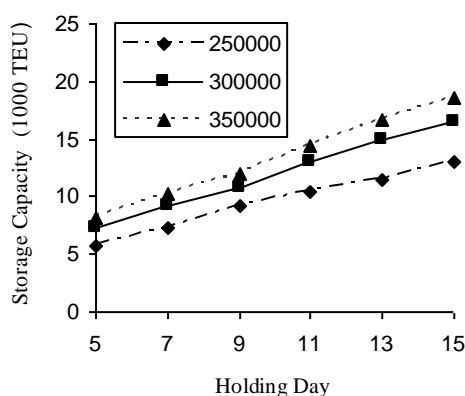
INVENTORY MODEL APPLICATION ON IZMIR PORT

According to the statistics on Izmir port, the recorded container numbers at yard countered in the certain time of each month are seen in Table.1.

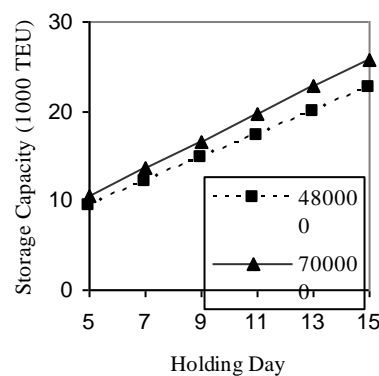
Relation between handling capacity and its holding days is represented as in Figure.2a. belonging to Haydarpasa port which is similar to Izmir Port. Both of ports are administrated by same port authority (TCDD governed by state). This figure is drawn for handling capacity, 250 000 TEU, 300 000 TEU and 350 000 TEU according to 1998 statistics, TCDD.

Months	Jan.	Feb.	Mar	Apri	May	Jun	July	Aug.	Sep.	Oct.	Nov.	Dec.
Total No	5140	5670	6320	6885	7540	8654	9947	11076	11816	12241	12864	13004
TEU	8620	9253	10140	10814	11725	13245	15042	16614	17156	17945	19227	20145

Table.1 Recorded Container number (Twenty and Forty Equivalent Unit) at yard (TCDD statistics'2002)

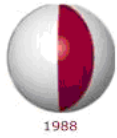


(a)



(b)

Figure.2 Holding time versus handling capacity



By using the numerical analysis, the handling capacity-storage days relation for handling capacity of 480 000 TEU and 700 000 TEU are developed by considering extreme days 5 and 15 (Figure.2b).

For 5-day, $y_1 = -1692057950 / x + 12927.63$

For 15-day, $y_2 = -4965825584 / x + 32931.38$

where y_1, y_2 ; storage capacities, the extreme points corresponding 5 day and 15 day holding and x ; annual handling capacity. According to handling capacity, x , forecasted for future, 5 and 15-day extreme points (storage capacities) are firstly calculated and then the a and b constants of linear form are stated by using Table.2 for obtaining the storage or holding days.

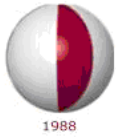
Years	2002	2005	2010	2015
a	1532.7	1529	1667	1528
b	2846.5	2846	2868	6490

Table.2 Linear form between holding day and storage capacity, $y = a x + b$

where y ; storage capacity and x ; storage or holding days are taken. For 2002, the handling capacity approximately 507 000 TEU is stated according to the statistics on 2002 (TCDD). Storage days, t_o , considered for each various container capacity, Q_s , are calculate from the mentioned relations. The model studies for Izmir port are realized as presented in the following tables.

Q_i	$Q_s - Q_i$	$Q_s - Q_i$	$Q_i - Q_s$
8620	5380	5380	0
9253	4747	10127	0
10140	3860	13987	0
10814	3186	17173	0
11725	2275	19448	0
13245	755	20203	0
15042	-1042	0	1042
16614	-2614	0	3656
17156	-3156	0	6812
17954	-3954	0	10766
17945	-3945	0	14711
19227	-5227	0	19938

Table.3 Idle or unserved container numbers for 14 000 TEU container capacity and 7-holding days (2002 years)



No	$Q_s - Q_i$	$Q_i - Q_s$	$C_{unserved}$	C_{idle}	C_{Total}	Q_s	t_0
1	20203	19938	832768. 6	554960	1387729	14000	7
2	26203	13938	615389. 5	594600	1387729	15000	8
3	33161	8896	442172. 1	634240	1076412	16000	9
4	40547	4282	291379. 5	673880	965259. 5	17000	10
5	49492	1227	211961. 9	713520	925481. 9	18000	11
6	60492	227	244917. 1	753160	998077. 1	19000	13
7	78265	2	328713	812620	1141333	20500	14

Table.4 Various container capacities and their total costs

The cost values and yard capacities obtained from Table.3 and Table.4 are drawn in Figure.3

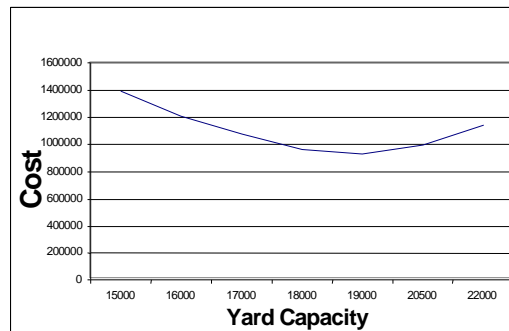


Figure.3 Cost versus yard capacity

By varying stocking capacity, Q_s , this objective function will produce various results based on monthly recorded container numbers, Q_i , to exist in a yard and stocking days, t_0 . The stocking yard capacity corresponding to the minimum total cost is therefore stated as optimum.

When the following procedure is maintained, macro and micro projection results to be used for the future extension in Table.5 assist to calculate the average storage days of each considered storage capacity and then the optimum storage capacity of yard and their minimum total costs are presented as in Table.6.

As seen in this table, additional storage capacity to be allowed for the four level stacking causes about 15% increase for first five-year planning term, and about 45% increase for second term according to the results of inventory method.



CONCLUSION

This study aims to determine the optimum size of container storage area in Izmir Port. For this purpose, the limited data are supplied from the relevant port authority. This data is only evaluated by using the inventory method. It is seen that, the inventory model yields roughly outputs for determining size of storage area at yard. The most important parameters such as the storage day, unit cost of ship delayed in offering the service are assumed and square meters of unit container by stacking height. The seasonal variation of container traffic and the daily changes in staying container at yard is not analyzed. The optimum values must be among data series of the container numbers at yard. This affects usage frequently of this model.

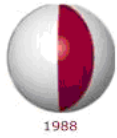
Months	2005	2010	2015
January	8 074	11 385	16 359
February	8 515	12 007	17 251
March	11 157	15 733	22 605
April	11 451	16 147	23 200
May	11 451	16 147	23 200
June	11 011	15 526	22 307
July	10 864	15 319	22 010
August	11 305	15 940	22 902
September	16 002	22 564	34 420
October	15 855	22 358	32 122
November	14 681	20 702	29 743
December	15 855	22 358	32 123

Table.5 Monthly container number countered at yard for future extension, according to forecasts obtained from macro and micro projections

Years	Handling Capacity	y_1	Y_2	t_0	$Q_{s,Opt.}$	$C_{Total,Min}$
2005	695 184	10 493	25 787	8	19 000	744 193
2010	980 785	11 201	27 867	11.5	22 000	1 127 039
2015	1 408 147	14 128	29 404	16	32 000	1 798 511

Table.6 Optimum storage area for future extension of Izmir Port

This inventory and cost model gives the general idea about size of container storage area. The data on Izmir port is analyzed and the reasonable outputs are yielded. The existing capacity is 18 000 TEU in 2002. Future storage capacities in 2005, 2010 and 2015 reach respectively 19000, 22000 and 32 000TEU.



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PRELIMINARY STUDY ON THE NORTH-AEGEAN CONTAINER PORT DEVELOPMENT

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The main objective of the preliminary study on NACP is to determine broadly the size and capacities of facilities located at water and landside to respond to the future container demand of Turkey. However, the cargo demand to be transferred from the neighbouring ports and countries are also considered.

The site investigations of the relevant port reveal that the suitable place shall be Candarli Bay, to locate a port. Water area requirements of the NACP will be broadly covered. But the land area requirements will be determined by forecasting the container traffic of the NACP to be involved in this study.

The container capacity is analyzed by employing macro and micro projection considering time series of container, mixed cargo and total cargo existing, gross national product (GNP), population and economical growth rate according to the statistics on government and Izmir port authority. However, container demand to be transferred by neighbouring national and foreign ports.

At the stage of decision making after macro and micro projection, the reasonable cargo capacity shall be assigned through many alternatives. According to this capacity, the handling equipment, water and land area of the NACP has been designing by relating between the number of ship and amount of cargo. This study allows for the future development of port in the scope of planning term extended to 2030.

Keywords: *Port Feasibility, Container Forecasting, Water-Land Area of Port, Handling Equipment, Macro-Micro Projection, New Port Plan*



INTRODUCTION

By developing the world marine trade, it is seen that containerization in Turkey is rapidly increasing. New container terminal to be situated especially in North Aegean coasts may be therefore required. The aim of this study is to determine how much size the North-Aegean Container Port (NACP) shall be designed.

The North-Aegean container port is planned as the biggest container ports in Turkey, situated at Candarli Bay in Aegean Sea. The forecasting demand for port traffic is generally determined by applying the macro forecast method on the basis of socio-economic conditions and the micro forecast method on the characteristics of cargo and ship flows. Macroscopic forecast is based on the assumption that cargo volume handled by port reflects the economic and social activities in the port's hinterland. The cargo volume is estimated by using the relation of economical growth, population density, and Gross National Products (GNP) between the hinterland and nation. Microscopic forecast is also based on analyzing numerically the time series on container number and also considering the containerization ratio in a port. Both forecast methods produces the different container volumes to be evaluated at the stage of decision making.

The prior study of the North-Aegean Container Port planned newly to state the hinterland size and subsequently, the cargo forecasts. The major port sharing the same hinterland **Haydarpasa, Derince, Mersin and Izmir (HDMI ports)** are successfully managed and have the short and long term development planning. Problem is to determine whether there is the amount of remaining container to be handled and stored for the new port construction immediately after the estimated cargo for developing the HDMI ports.

Macro and micro projection methods are used to estimate the future volume of container cargo in HDMI Ports. The statistics on economic growth, population and GNP for the eight hinterland cities and nation are taken into account. The hinterland cities are connected by highway and railway connections to the port. In macroscopic projection study, total handling cargo volume and break-bulk with container cargo volume to socio-economical levels and GNP values of hinterland cities are estimated and the containerization rate are taken into consideration. Microscopic projection also produces the number of ship and container for future by considering the linear, non-linear regression methods.

In making the decision, the considered cargo volumes obtained from the micro and macro projection is added to the amount of transit cargo to be able to transfer from the neighborhood ports.

The number of berths and size of storage area are calculated by conventional methods based on the parameters assumed as working days in the year, number of shift, shift profitability, gantry crane handling duration per TEU, average holding day Per TEU, the required area for stacking height per TEU, Stacking height factor, storage area reservation factor, CFS percentage, average holding days in CFS. Total storage area is composed of full container, empty container and CFS areas.



In five-year periods of long term planning, the total lengths of required berths are located and the total storage area is located at Candela Bay. Even though the layout of these structures necessitates the oceanographically, meteorological, hydrographical, geotechnical, navigational studies in detail, this layout is characterized as the preliminary study including the general layout principles. The preliminary studies priorities the layout of berths, breakwaters and storage to respond to the water and land area requirements the harbor traffic and container handling. Berths parallel to the coast are design at the beginning of planning periods. With the time, new berths in pier type by dredging the coast with angle are designed and berth length is extended.

DESCRIPTION OF CANDARLI SITE PLANNED FOR THE NACP

The planned port is in the Zeytindag town and located at the coast of Candarli Bay which has a 20km-long coastline, to that the 4-5% sea bottom slope is perpendicular, and at least 12 millions square meter land area that belongs to public utilization. Therefore, there is no nationalization problem in respect to supplying the required area for location of port facilities (Figure 1). The ancient port, that shall be kept intact even if the new port is operated, is located at eastern Candarli Bay situated.

When the location of the NACP is investigated from aspect of highway and railway connection, it is seen that it is 7 km long to Canakkale-Izmir highway and railway network and about 80 km far from Izmir metropolitan area by highway and railway. If the seaway is utilize, this distance takes 55 miles to Izmir port. The port is connected to hinterland, covering the provinces such as Izmir, Denizli, Manisa, Usak, Afyon, Mugla, Aydin, Balikesir, Bursa and Konya, in inclusion of highway network.

CONTAINER CAPACITY OF NORTH-AEGEAN PORT

The cargo traffic of this port consist of *generating traffic*, resulting from economic and social conditions of hinterland, *developing traffic* which is changing with time and *transferred traffic*, which is that a part of ship traffic may shift from neighbouring ports as soon as new port operate. If the high performance in service level and economic handling of new port is maintained, the tranferred container traffic may be successfully transferred from East Mediterranean ports. Container traffic generating from population and economic growth of Turkey in general is mostly shared by Haydarpasa, Derince, Mersin and Izmir ports. For preliminary study of new port, the generating container traffic is developed by using macro and micro projection extended to the end of planning term. Also for the mentioned ports, the similar study is made by themselves. The total national container traffic is shared by the HDMI ports. The generating and developing traffic is thus obtained as the remaining part of total national container traffic.



Figure.1 The site of the NACP, surrounded by neighbouring cities and towns.

Macro Projection

The rate of economical growth of Turkey is taken as 6% with respect to that of hinterland, 7%. Total population of cities situated at hinterland reaches to 12% of Turkey's population. If 1990 is accepted as the reference year, the total cargo demand and mixed cargo demand with containers can be calculated by macro projection from aspect of social-economical factor and GNP. Table.1 shows the total and mixed cargo demand, Q, resulting from socio-economical factor and GNP by using macro projection technique.

Years	Realized Cont+m ixed	Total Load		Contaner+Mixed Load	
		Q _{spx}	Q _{sx}	Q _{kspx}	Q _{ksx}
1998	6.321.95 7	7.014.29 3	24.452. 434	2.530.72 3	6.219.39 2
1999	7.184.41 3	7.513.68 9	25.919. 580	2.710.90 4	9.351.66 6
2000	8.164.47 0	8.038.95 6	27.474. 756	2.900.41 9	9.912.76 6
2010	-	17.017.1 24	49.203. 102	5.735.07 8	17.752.2 54
2020	-	21.430.9 08	881.152 .263	11.340.1 28	31.791.5 83
2030	-	62.149.2 01	157.801 .016	22.423.1 48	56.933.8 84

Table.1 Macro projection values (in ton) for the NACP



where sp and ksp indices represent total and mixed cargo demand resulting from the social and economical factors. On the contrary, s and ks indices are used for those from GNP factor. As seen in Table.1., Q_{ksx} values are estimated sufficiently acceptable when the realized and expected container plus mixed cargo are compared.

Micro Projection

In this part of study, the various statistics can be used for estimating the number of containers by the mico projection. These are grouped into four aspects: statistics on total cargo handled in Turkey's ports (Table.2), statistics on total mixed cargo and containers handled in Turkey's ports (Table.3), statistics on total cargo handled in Turkey's ports (Table. 4), statistics on total mixed cargo and containers handled in TCDD ports

Year	Import (Unloading)	Export (Loading)	Cabotage (handling)	Total Cargo Handling
1984	28.530	11.148	34.073	73.751
1985	29.710	11.462	37.871	79.043
1986	29.026	13.364	41.262	83.652
1987	35.558	12.941	46.747	95.276
1988	35.072	19.409	41.421	92.902
1989	32.773	14.755	44.466	91.944
1990	41.467	14.877	39.362	95.886
1991	47.439	19.165	29.671	96.275
1992	47.127	20.510	31.964	99.601
1993	60.003	17.379	34.313	111.695
1994	52.600	22.100	34.000	108.700

Tablo.2 Import, export, cabotage and total cargo statistics of state ports (10^3 Ton)

(TCDD is the governmental institutions in Turkey, governs the state ports and is named as General Directorate of Turkish Railways) (Table.5) and statistics on total mixed cargo and containers handled in only HDMI ports (Table.6).

Mixed cargo will transfer container with time. Therefore, total container tonnage handled by Turkish ports and total mixed cargo, to be containerized with time, in TCDD ports will be evaluated by using logistic curve approach which states the target year in which containerization ratio 100% will have been realized. The mixed cargo in TCDD ports is thus containerized by depending on the ratio realized in Turkish ports. In considering the expected container tonnage for the projected years, the containerization ratio will be used for transforming the mixed cargo. Table.7. shows the containers in Turkish ports and mixed cargo in TCDD ports.



Year	International Trade (Ton)			Cabotage (Ton)	Total (Ton)
	Export	Import	Total		
1984	6.190.053	10.083.337	16.273.390	5.384.408	21.657.789
1985	5.874.157	11.612.868	17.487.025	7.212.482	24.699.507
1986	6.056.351	9.674.896	15.731.247	6.558.995	22.290.242
1987	6.169.662	12.491.508	18.661.170	8.724.739	27.385.909
1988	8.301.921	10.988.924	19.291.745	5.162.831	24.454.576
1989	8.511.831	12.802.544	21.317.375	11.108.507	32.425.882
1990	9.697.677	14.311.317	24.008.994	10.586.236	34.595.230
1991	10.598.575	15.882.816	26.481.394	9.845.329	35.565.723
1992	11.141.500	15.882.127	27.024.627	10.239.312	37.263.939
1993	11.022.245	23.822.940	34.845.185	11.574.917	46.420.102

Table.3 Statistics on mixed cargo and container handled in state ports

Ports	1988	1989	1990	1991	1992	1993	1994
Haydar pasa	3.170	2.897	3.230	3.411	3.566	4.074	3.563
Bandir ma	2.619	2.433	2.417	2.423	3.108	3.270	2.778
Derince	598	866	2.381	824	975	1.590	1.000
Samsun	2.102	2.782	2.495	1.890	1.521	1.824	1.214
Izmir	-	2.706	2.944	3.194	4.243	5.056	4.623
Mersin	10.096	10.109	11.576	11.517	11.810	11.667	10.874
Iskender un	3.165	3.465	1.917	2.099	1.703	2.357	1.736
TOTAL	23.776	25.258	26.960	25.359	26.926	29.837	25.789

Table.4 Total cargo handled by TCDD ports (10^3 Ton/Year)



<i>Year</i>	Total Load	Mixed Load	Container Load	Total of con+m ix	Ratio%
1988	23.776	7.977	1.913	9.890	19.34
1989	25.258	6.109	2.512	8.621	29.14
1990	26.960	6.250	3.167	7.941	33.63
1991	25.359	6.276	3.411	9.678	35.24
1992	26.926	5.967	3.986	9.953	40.05
1993	29.837	8.115	5.139	13.254	38.77

Tablo.5 Mixed cargo and container (handled by TCDD ports)(10^3 Ton/Year) and, their containerization ratio

<i>Year</i>	Mixed Load (Ton)	Container (Ton)	Total of Cont + Mixed Load	Containerized %
1988	6.120,58	1.857,60	7.978,18	23.28
1989	4.689,16	2.451,99	7.141,15	34.34
1990	5.528,92	3.121,47	8.654,39	36.11
1991	5.551,76	3.365,92	8.917,68	37.74
1992	5.115,61	3.946,93	9.062,54	43.55
1993	5.750,78	5.090,29	10.841,07	46.95
1994	4.569,11	5.435,19	10.004,30	54.33

Tablo.6 Container and mixed cargo handled by *HDMI* (Haydarpaşa, Derince, Mersin and Izmir ports) ports (10^3 Ton)

<i>Year</i>	Mixed Load (10^3 Ton)	Container (10^3 Ton)	Ratio% (cont/mixed cargo)
1988	24.455	1.205	4.93
1989	32.426	2.512	7.75
1990	34.595	3.167	9.15
1991	35.566	3.411	9.59
1992	37.264	3.986	10.70
1993	46.420	5.139	11.07

Table.7 Comparison of containers in Turkish ports and mixed loads in TCDD ports



By using data in the mentioned tables for micro projection based on regression analysis (linear, logarithmic, exponential and power), the container traffic, Q_x , is expected for future as the combination of regression values instead of preferring the best one obtained from regression analysis. The container tonnage for future is expected as seen in Table.8.

Years	Expected total cargo		Total Cont+Mixed Cargo		Total Cont+Mixed Cargo		Cont+Mixed Cargo
	Turkey's Ports	HDMI Ports	Turkey's Ports	HDMI Ports	TCDD Ports	HDMI Ports	Only HDMI Ports
1998	120 349	30 087	9 077	4 992	8 793	6 595	7 858
2000	126 370	31 592	14 756	8 116	10 041	7 530	8 835
2010	157 907	39 476	35 254	19 390	15 225	11 418	13 028
2020	193 005	48 251	52 434	28 838	20 619	15 464	17 680
2030	233 428	58 357	66 095	36 352	27 882	20 867	23 920

Table.8 Total cargo, and mixed cargo covering containers, expected by using micro projection technique in Turkey's ports and HDMI ports(10^3 Ton/Years)

According to the outputs from this table, 25% of Turkey's total cargo, 55% of Turkey's total mixed and container tonnage, and 75% of mixed and container tonnage in TCDD's ports is responded from HDMI ports.

Expected Container Traffic Capacity According to Macro and Micro Projection

In 2030, the expected value of mixed and container tonnage can be preferred as 36 352 657 tons in average except maximum and minimum expected values for HDMI ports. The expected traffic potential of NACP is determined by subtracting the expected cargo to be handled by the Haydarpasa, Derince, Mersin and Izmir ports that . Usable capacities of these ports are subtracted from expected values.

In 2030, Haydarpasa port with 1 875 000 tons, Mersin port with 4 025 000 tons, Derince port with 7 974 540 tons and Izmir port with 5 000 000 tons may realize to handle the container tonnage in the scope of planning term. In this situation, the expected container capacity of NACP would be 1 747 811 TEU (if assumed 10 tons per TEU).

In order to estimate the amount of container which may be transferred from foreign neighbouring ports, this study only assume that a part of transit container loads of some East Mediterranean ports may be transferred. The transferred container capacity of NACP is expected as approximately 1 200 000 TEU in 2030 according to the pessimistic scenario.



SELECTION OF HANDLING EQUIPMENT

Types of handling equipment, which is stable or mobile, to be selected, their capacities, managing strategies of port affect size of storage yard and amount of profit of port management. The capacity of handling equipment leads to minimize the waiting times of ships to be served in berth and however to let fall in handling cost of each container. So the port shall be much used and become more attractive for ships to be considered as the transferred traffic. By providing faster and qualified service in berth together with increasing this traffic, the productivity of handling equipment will rise. This leads to wait shorter time of ships in berth and therefore to necessitate less number of berths and smaller size of container stocking yard.

Handling equipment to be selected for NACP is composed of gantry cranes, trailers-tractors, transtainers and forklifts was planned. Gantry cranes for handling ships, trailers-tractors for transporting from berth to the yard, transtainers for handling containers on the yard and forklifts for container washing and stacking activities are employed. Computation of transport process of yard is based on such working principle.

AREA REQUIREMENTS

Sizing breakwaters and berths, which are infrastructure elements to be located on sea area, can be estimated by working on alternative port layouts. While designing the maneuvering circle for ship traffic line, it is seen that full circle results in too much water area and therefore large dredging area and great volume of bottom material to be dredged. In the light of this design, the half circle is drawn between breakwaters and quaywalls. These elements are parallel to each other and placed at sea bottom curves which are laid as parallel straight lines to coastline.

Relation between Water Area and Ship-Cargo Traffic

Container traffic expected in 2030 is about 2 900 000 TEU. Lengths of the container ships varies between 143 and 369 m. By taking the length of a third generation ship into account, required berth length is found as 325meters.

When a gantry crane which is taken as 350 working days in a year, 7.5 hours of shifting period and shift efficiencies 100, 90 and 80% respectively, 405-TEU handling in a day can be conducted with assuming that handling per TEU takes 3 minutes. In case of a ship handled by two cranes and 400 TEU of assumed container numbers per ship, handling operation takes for 0.49 day. If a ship spend 60 minutes for approaching to quays and leaving them, total time spent, for service and delay, per ship is 0.54 (about 0.50) day. It means that two ships are handled in a day. In a year, two ships can handle as much as 283 500 TEU (about 280 000 TEU if accepted utilization ratio of ship,100%).In this case, 10 ships can serve at the same time in port. The required berth shall be 3250 meters long.



A total berth length of 3430 meters is designed. The port land area will be covered with filling material up to +3 meters elevations. Berthing place, approach channel and the port entrance will be dredged to -14 meters and approximately 18-20 meters high gravity type caisson quay will be constructed. Total breakwater length is planned to be 3840 meters (offshore breakwaters, 3240 meters long, and secondary breakwater, 600 meters long). main part in the open sea, and 600 m of secondary part. 375 meters-long opening (design ship length plus 25 meters) is located between the breakwater and berth for ship maneuvering. The entrance and exit locations of the port are designed at separate section of ports.

Relation between Land Area and Ship-Cargo Traffic

The stock area is composed of area for full and empty containers, open storage area, container freight station area. Main part of area is usually occupied by the storage yard.

In case of triple stacking, the recommended area per TEU is taken as 10m^2 . If 25% of total capacity, 2 900 000 TEU, is described as transit load and however 1/3 ratio of the remaining capacity and remaining part are respectively sent to the CFS area and the hinterland, full and empty container storage yard is respectively calculated as $503\,480\text{ m}^2$ and $352\,433\text{ m}^2$. In this case, storage time in depot as 10 days, stacking height factor as 0.8, area reserve factor as 1.4 and working days in a year as 360 should be taken. If 1/3 of the CFS area is assumed, $170\,341\text{ m}^2$ of covered area, and $340\,682\text{ m}^2$ of open area will be needed.

By assuming that half of the total storage yard area is empty, the total storage yard area will be $2\,800\,000\text{ m}^2$. This area is needed to be ready for use in 2030 when port works with full capacity. The area needed for the other facilities is smaller than the storage yard area. Therefore, it is not considered in scope of this study.

CONCLUSION

Candarli region is quite available in terms of site selection of port, easy transportation to national network, adequacy from water and land area aspects, easiness in nationalization of port area, hinterland capacity. Availability of port extension area for industrial development, technical and economical feasibility for design and construction of port facilities and availability in term of field investigations are the reasons to select Candarli Bay as the suitable port site. Finally, this study is only carried out as preliminary study of North-Aegean Container Port. Feasibility study of NACP may be maintained later.

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HUMAN RESOURCE DEVELOPMENT STRATEGY FOR OIL SECTOR IN LIBYA

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Oil & gas prices driven crisis in recent past has led to mergers and acquisitions resulting in to permanent loss of over 200, 000 jobs in exploration and production (E&P) alone during the last ten years. The increased competition for professionals has dramatically increased & is expected to remain so in the years to come. Continuous improvement in the quality human resource planning using more rational, prudent and intelligent processes is vital to achieve prevention oriented and problem free administration of oil & gas industry in Libya. This paper is designed to present background, need, structure and content of a unique body of knowledge relating to the human resource development strategy and job turnover reduction challenges using information and communication technology aspects of case study petroleum industry related organizations as key players in Libya.

This paper describes that how data bases compiled from a detailed comprehensive survey using checklist and score card and interviews for case study organizations to identify and further investigate the factors and factor interactions that contribute to the success of job turn over reduction in Libya. A benchmarking survey is also conducted by gathering information across several companies to define priorities for action and improvement targets. The objective is not only to highlight the importance of quality of job turn over reduction planning, organizing, directing and control but also focus on key issues by analyzing HR value chains to address strategic, operational and other challenges of industry.

Analysis and evaluation of data gathered from Oil & gas sector stakeholders as respondents in Libya demonstrates that there is need for paying adequate attention to attracting, nurturing through development of higher brain potential and retaining right talent. Finally, the paper demonstrates that how organizations are increasingly becoming more intelligent and capable of predicting the needs for competencies to match the rapidly emerging oil sector business needs. This is achieved by developing new culture and structure, review job design, procedures, performance management and job turn over reduction policies in order to save money, time and effort.



1. INTRODUCTION

The main aim and objective of Libyan manpower planning in oil & gas sector is to prepare workforce based upon competency assurance process that help enable work force perform to the required standard in the job. It is designed to equip candidates with relevant awareness, knowledge, skills and attitude that help to perform their jobs safely and effectively. It is being pursued by a. setting the defined job standards/ requirements; b. assessing individuals against job requirements, c. defining improvements/ potential areas (short falls) and d. restoring short falls through specific training. The entire process is by and large based on relevant and comprehensive information about a state of affairs at any given time and on forecasting future requirements.

The primary planning objective is to maintain a manpower level, which enable the organizations to continue achieving its planned objectives at all activity levels. This necessitates the recruitment of expatriates in occupations where a shortage of locals may exist. The corporate employment policy permits to recruit expatriate manpower under very restrictive regulation and a lengthy administration process. A Libyanisation program has been in effect for the last 25 years but it seems to have been only successful in Libyanising positions at management levels and administrative job categories in support departments.

Law15/1981 that was put in to effect on January 1982 governs manpower issues related to all jobs and salary structure for Libyan national employees in oil & gas sector. Within this fixed grading system all job requirements are matched with grade descriptions to fit a specific grade. Management and supervisory jobs are assigned to grades according to their managerial ranks. The same principle applies to professional and technical jobs. The state of the art as presented elsewhere by authors (1,2) shows that restrictions on income introduced by these policies had a long-term impact on both individuals & companies. It results in to job turnover and brain drain and makes companies to maintain the required manpower levels with international markets input to overcome shortages.

The above scenario shows that Human Resource (HR) planning and HR management tools for decreasing turnover of oil & gas sector in Libya poses one of the biggest challenges of the century. New trends, new roles, new job analysis techniques, new global competitions, advancing technologies, new concept of work ownership, new hiring processes, new career management techniques, new laws, new corporate cultures, new expectations, new needs, new turnover reduction policies and new environmental determinants are shaping it. Turnover is considered to occur when an employee ends his or her membership of a company, or firm and or an organizations where he or she receives monetary compensation for the work done. It is an important issue that needs to be examined closely by managers. This helps not only in diagnosing the turnover causes but also in designing and implementing policies, evaluating the effects of changes and anticipates if further changes are required.



Libya accounts for around 5.5 million populations with a gross domestic product of over \$35 billion. Its petroleum reserves of 29.5 billion barrels are the largest on the African continent. It is second largest crude oil producer in Africa after Nigeria. United Nations Development Program (UNDP) National Report on Human Development 2002, Libya, indicates that high school graduate and those with higher degrees form around 25% of its population. Public sector employees in Libya that started at the beginning of 1970's peaked in 1984 at 54%. It declined to 39% in 1995 and has rose again to 48% in 2001 after implementation of Shaabiat system.

Hydrocarbon sector contributes to 92% of the country's economy. High turnover among energy sector employees that form the backbone of the country's economy is of the order of around 20%. Limited earlier studies have reported a complex relationship between turnover, brain drain due better job prospects with high income in Gulf region for experienced staff and absenteeism. Other factors reported are A bad match between the employee's skills and the job, Substandard equipment, tools, or facilities, Lack of opportunity for advancement or growth, Feelings of not being appreciated, Inadequate or lackluster supervision and training and Unequal or substandard wage structures, etc, All these studies findings indicate generally three interrelated groups of factors i.e. economic, organizational and personal.

Over 85% of the Libyan population aged between 5-24 are in full time education with 45% of these students being female. Magnitude and direction of change in education in Libya is growing rapidly in comparison to other third world countries in the region. The objective of manpower planning in the Libyan energy sector is to build local skill base especially in its core activities in the production and manufacture of oil & gas that contributes to over 90% of countries income.

During recent past, Libya has reaffirmed its commitment to develop a set of coherent policies for the sustainable management of the manpower resources. The country is fully committed for the full implementation of Agenda 21 and the program for Further Implementation of Agenda 21. The country has continued to make positive progress in terms of its effective participation in the international community programs and events for integration of the three components of sustainable development – economic development, social development and environmental protection – as independent and mutually reinforcing pillars. It has made significant movement towards recognition of the relevant aspects of the Millennium Development Goals (MDG) and in the outcomes of the major United Nations conferences and international agreements since 1992.

2. AN OVERVIEW OF MAN POWER PLANNING IN OIL & GAS SECTOR IN LIBYA

Libya accounts for around 43000 employees serving the oil & gas industry. The rising growth of Libyan workforce scenario (local, new in take and leavers) are evident from the table 1 through table 6. As obvious during last five years trends indicates how intake and exit, nature of services, skill level, geographical location, composition are not regular undefined and does not indicate a consistent growth pattern.



Year	2000	2001	2002	2003	2004
Total employees	38992	40570	40859	41392	42902
Local	35835	37550	37762	38798	38810
New in take	2005	2730	1529	1819	1470

Table 1 Manpower growth during 2000-2004 in oil & gas industry in Libya

Year	Leaver	Transfer	Termination	Retiree	Death	Total
2000	237	155	380	579	83	1434
2001	178	162	303	407	114	1164
2002	161	118	339	419	68	1105
2003	251	119	345	437	114	1266
2004	257	119	345	437	115	1273

Table 2 Manpower turnover causes during 2000-2004 in oil & gas industry in Libya

Year	2000	2001	2002	2003	2004
Companies	420	451	472	564	650
Authorities	14	14	16	16	16
SMEs	219	257	323	437	527
Offices	65	72	76	86	90
Agencies	11	12	12	12	12
Others	1	1	1	1	1
Total	730	817	900	1116	1295

Table 3 Manpower agencies growth during 2000-2004 in oil & gas industry in Libya

Year	Doctoral	Graduate	Undergraduate	Diploma	Skilled	others	Total
2000	8	15	234	131	52	994	1434
2001	2	21	202	94	54	791	1164
2002	0	30	166	71	24	814	1105
2003	8	35	271	107	109	735	1266
2004	8	37	273	106	101	748	1273

Table 4 Manpower educational level growth during 2000-2004 in oil & gas industry in Libya



Year	Cities	Oil fields	Harbours	Total
2000	622	407	405	1434
2001	425	367	372	1164
2002	359	376	370	1105
2003	425	392	392	1266
2004	429	392	429	1273

Table 5 Geographical Location of Manpower growth during 2000-2004 in oil & gas industry in Libya

Year	2000	2001	2002	2003	2004
Expatriate	22	14	15	15	16
Arabic origin	3	3	3	3	3
Servicing	4	4	4	4	4
Technical	99	112	132	147	150
General	100	102	112	133	136
Total	238	235	266	302	309

Table 6. Manpower agencies composition growth during 2000-2004 in oil & gas industry in Libya

The status of manpower planning and its integration into sustainable development issues along with human development issues in Libyan government mechanism and policy continues to strengthen its determination to implement Agenda 21. This vision is considered as a concrete and efficient means of protecting the country from all sorts of brain drain due to high turnover associated with oil and other industrial production processes and to promote sustainable development. This will also promote sustainable human well-being through protection of heavily polluted almost 2000 km of coast of Libya through sources like mud waste used in oil drilling that is often buried in improperly designed pits which carries with it a significant risk of ground water pollution.

NOC has overall responsibility for manpower planning concerns, action policies, strategies and programs including oil & gas projects in Libya. The Libyan vision, commitment, and determination to make greater contribution to the common cause of humanity is today in need of a comprehensive analysis in order to consolidate its National Program for Manpower Action which is at this stage only piecemeal and adhoc. This also needs to define modalities of implementation in terms of roles, responsibilities and instruments for change, logistics, resources, clearly defined targets, expected results and timeframe together with arrangements for funding and monitoring, coordination and implementation mechanisms. In addition, the country leadership has expressed its commitment to plan and support programs at African Union level to develop an Action plan as a cooperative and efficient means of industrial productive capacity of the region to promote sustainable development. This would need developing effective partnership initiatives that work with 1. Clear guidelines and transparent credible selection process, 2. Strong participation from a wide range of stakeholders, all of whom should feel ownership of the partnership objectives and plans. 3. Trusted facilitation 4.



Funding 5. Strong linkages between partnership and existing country-led sustainable development processes and 6. A robust, credible follow-up process. PTQI has plans to enhance and strengthen its scientific and technological capabilities through promoting ICT use to truly become a center of excellence and a pump house of knowledge and originality. To meet this goal it has formulated proposal, aimed at reinforcing the institution, in particular in terms of ICT investment, capacity building for its human resources, and to a smaller extent of reinforcing some of its information technology platform for learning and better efficiency and performance.

2.1 NOC Strategy

Libya over the year has developed a very positive experience involving national stakeholders and deepening their understanding and awareness on manpower planning issues and mainstreaming these into the overall economic and social thinking. In the field of manpower planning NOC future activities include assisting:

- individuals developing new skills through training
- improving communication within institutions
- increasing transparency and accountability
- improving communications and relationships between institutions
- Establishing enabling environments (legal frameworks, policies)

NOC has plans

- To prepare man power using competency assurance process to meet the challenges of maintaining a continuous learning organization
- To See the scale of tasks of implementing international obligations and what is needed
- Be an Eye-opener for the linkages between obligations, sectors, institutions, etc.
- Help networking between institutions (national/regional) and people/experts
- Enhance capacities for systematic analysis of issues & priorities
- Help with resource mobilisation
- Seek to integrate/be aware of other relevant processes like Millennium Development Goals(MDGs) etc and most recently the proposed Intergovernmental Strategic Plan for Capacity Building & Technology Support

NOC KEY PRINCIPLES FOR NATIONAL CAPACITY SELF ASSESSMENT (NCSA)

- Ensuring national ownership, leadership and policy commitment
- Using existing mechanisms and structures whenever possible
- Promoting multi-stakeholder participation
- Adopting a holistic approach to capacity building



- Adopting a long-term approach to capacity building
- Considering obligations of the three Rio Conventions
- Balance Between *Process* and *Product*
 - *The process should increase stakeholders buy-in*
 - *The Product should be of high quality so that government take recommendations/actions as priorities into national budgeting and donor can support it*

The current proposal under the form of a turnover project, aims at ensuring at relatively short notice, access to and progressive ownership by the Libyans, of the required technical and instrumental capacities. This would also provide opportunities for implementation of practical steps like rapid diffusion of manpower data, information on best practices for the manpower planning and sustainable use of manpower resources, as well as partnership and cooperation through networking. This will enable, NOC (i) to fulfill some on-going actions (ii) better coordinate human resource planning work in the country, (iii) bringing together partnerships and (iv) open new opportunities which should give manpower planning issues a sounder and broader basis for the future.

In this turnover project proposal PTQI will provide primarily expertise to NOC by assembling a team of top technical experts, engaging professionals and advice services and secondly contribute to training sessions and general information and communications activities. It will also facilitate access to lessons learned from best practices especially by making local people and organizations part of the project design and implementation process and international experience from several types of actors in manpower planning work at national/central, decentralized/Shah'biyate (governorates) and specific branch or sectoral levels.

This will take the form of: Review and assessment of existing reports and documents on issues related to the field of action of NOC and subsequent contribution to the elaboration of the National Strategy for Human Development, and the National Plan for Agenda 21 including implementation schemes and instruments at central and local/Shah'biyate level.

More specific it would carry out an analysis of the state of the manpower planning and the development of action plans in oil & gas sector. This will also include transfer of new manpower planning practices with closed loops, no waste, and no toxicity that help protect the biosphere that sustains life by promoting the use of resources such as energy, water, fiber, minerals, and topsoil far more effectively.

The definition and implementation of a methodological approach and pilot projects to help NOC better meet its mission of coordination of international and national stakeholders and partners in the field of manpower planning.



Assistance in establishing knowledge centers in Sahara communities to play a valuable role in promoting both an evergreen desert farm revolutions rooted in the principles of ecology, economics, gender and social equity, and employment generation and the economic viability of micro-enterprises supported by micro-finance.

Assistance in interagency collaboration with a focus predominantly on ecosystem spanning countries in Africa Union (AU).

Assistance in implementation of the AU as evidenced by the Framework of the Action Plan on the Manpower planning Component of the New Partnership for Africa development adopted by the African Ministerial Conference at its meeting held in Kampala in July 2002.

At the international level, PTQI will help NOC to not only in transfer, adapt, adopt, absorb and embrace advanced technology and governance practices but also access to most up to date and unbiased scientific data and information to confront challenges of future. This would help NOC to play an effective and leading role in promoting international cooperation with organizations of the UN System, among others UNEP, UNESCO, FAO, as well as, regional counterparts (Mediterranean, Arab, Sahel and other African) and also other multi- and bilateral funding or assistance providing sources. More importantly it will help NOC to shape the policy directions that will allow it continue playing a role in mobilizing financial resources to address job turnover threats.

3. AN OVERVIEW OF OIL & GAS INDUSTRY IN LIBYA

Libya is Africa's major oil producer and one of Europe's biggest North African oil suppliers. Supplies from North Africa to Europe destinations have the advantage of being both timely and cost effective. Libya's economy is based on oil and exports contribute between 75% and 90% of State revenues. Libya has a production capacity of 1.4 million barrels per day. Italy, Germany, Spain and France account for 74% of Libya's exports.

Foreign involvement in Libya was severely reduced as a result of the sanctions and embargoes em placed upon it, especially between the years of 1992 and 1999. Access to oil industry equipment and technology was restricted and Libya is reliant on foreign investment to keep the industry active. After almost 10 years, sanctions were lifted against Libya in 1999. With the suspension of sanctions, oil companies have shown an eagerness to invest in Libya, and a poll of 76 global oil companies (New Ventures 2000 survey) indicated that Libya is the number one preferred location for oil exploration and production.

The reasons for this are numerous. It provides extremely high grade, sweet crude. It has very low production costs and the oilfields are close to the refineries and markets of Europe. In addition, despite almost half a century of exploration, Libya remains largely unexplored with vast oil and gas potential.

Libya's downstream sector was exceptionally hard hit by the sanctions. Its three refineries have a nameplate capacity of 348,000 bpd, which is nearly twice its domestic consumption. The refineries, however, are outdated and desperately in need of upgrading, a matter which has been difficult as sanctions have made equipment and technology less accessible. Libya plans to upgrade its existing refineries and build new refineries.



In addition to its oil industry, Libya has an active chemicals industry as well as being one of the larger markets in the African lubricants industry.

Since 1968 the state owned National Oil Company (NOC) together with its 33 subsidiaries has controlled the entire gas and oil industry, both upstream and downstream. NOC and its subsidiaries account for 63% of Libya's production. The main subsidiary production companies are Arabian Gulf Oil Company (Agoco), Waha Oil Company (WOC) and Sirte Oil Company (SOC). Since 1979, NOC has been allowed to enter into agreements with foreign oil companies. Numerous international companies are engaged in exploration / production sharing agreements with NOC, the largest being Agip-ENI. Oilinvest is the international arm of NOC, with subsidiaries Gatoil and Tamoil controls a network of overseas refineries and manages all international investments. UMM Jawwaby Oil Services is the procurement arm for NOC based in London.

Libya became a member of OPEC in 1962. At the beginning of 1999, Libya's OPEC production quota was 1.227 MMbpd.

4. PETROLEUM SECTOR EDUCATION & TRAINING AS A REASON FOR JOB TURNOVER

Education & training in petroleum sector is viewed to equip the future energy professionals with qualities such as initiatives, entrepreneurial attitude and adaptability and allow them to function with greater confidence in modern day work environment.

Petroleum Training & Qualifying Institute in Libya founded 25 years ago in Tripoli is engaged in specially designed education and training programs to equip technical manpower that enables them to perform their jobs to the required standard using competency assurance process. It feels that oil & gas education & training with enhanced ICT use must service as a lubricant between individual society and its needs. Institute is moving from a prevailing traditional model of education based upon selective and concentrated learning and study for a limited period towards life long learning for all. This requires sufficiently, diversified and flexible system of access to meet the challenges of rapidly changing workforce. Graduates must be not only job seekers but also job creators.

In a knowledge based modern economy energy industry needs graduates who are thinking workforce who are willing to accept the need to keep changing jobs by updating their knowledge and learning new skills. Energy management work is radically re-defined and the large part of specific knowledge that student acquires during the initial training will rapidly become obsolete. In US this rate is 20% a year. Continuous and interactive partnerships with universities/institutions are essential.

The relevance of energy education is considered primarily in terms of its roles and place in society, its function with a regard to teaching, research and services. It must include matters like democratization of access, accountability and opportunities. It covers its mission, function, program, its content and delivery system with respect for academic freedom and institutional autonomy. It should also include its participation in search for solution to pressing problems such as population, environment, peace, international understanding, democracy and human rights.



Quality is a multidimensional concept and must include the quality of the staff, programs and students as well as its infrastructure and academic environment.

Internationalization is a reflection of universal character of learning and research. It should be based upon genuine partnership and the collective search for quality and relevance in energy management education.

As per a recent estimate 70 to 80% of economic growth is derived from new or improved knowledge imparted through engineering curriculum. In the year 2000, contribution of technical progress to growth in Europe is estimated at between 25 and 50%-a much greater in high technological area. Unfortunately 10% graduates in science & technology find jobs in the field they are trained in.

The above shows that petroleum sector education & training curricula needs to be revised to implement impact of changeover from current system to proposed system by identifying the impact, measuring the impact, evaluating the impact and communicating the impact to interest parties. Petroleum Institute hopes this change over will be carried out in an harmonious manner to set the agenda for guiding the destiny of energy management education through curriculum development.

5. JOB TURNOVER STUDIES IN LIBYA

Petroleum Training & Qualifying Institute Libya based upon its reflection exercise on roles, trends and challenges in education has developed programs like job turnover reduction for sustainable man power development of energy industry.. It has identified challenges in education as challenge of relevance, quality and internationalization. It has designed a comprehensive questionnaire to compile considered views, ideas and opinions of sample of employees. This questionnaire objective is to know considered views, perceived problems and suggested solutions with regard to diverse aspects of Job Turnover problems in petroleum sector of Libya. Through this survey, it has helped to seek feedback from answers from the work force at various levels the way really feel.. In order to further improve the usefulness of survey, spaces for comments has been provided under every section and a space for final comments is also provided at the end of survey.

Survey has helped in identifying 18 issues (open-ended questions) covering the 8 themes for which response is sought. There are five themes for which respondents are requested to treat them as check off questions requiring them to give a rating of 1 to 5 for importance of a specific item.

The results of this survey helped to determine whether a need exists to:

1. Diagnose turnover and reformulate the existing job turnover reduction policies and to introduce different strategies and plan of action
2. Evaluate the effects of changes and anticipate if further changes are required
3. Developing prevention methods that help in attaining employees loyalty and commitment



The study based up on limited responses from various organizations related to energy industry companies, firms, organizations related to education & training, and its management have helped to identify, define and analyze problems related to turnover issues. Most of respondents feel that need for change to ensure effective turnover reduction at affordable costs. The role of working with community and private sector participation is important. They place considerable emphasis on change and development needed to promote student centered learning, and to depart from conventional rigid training based upon taught code of practices. New programs must include more interactive use of computers for deep learning, parametric study by changing the important design parameters using Graphic user interface (GUI), environmental, management and economics related courses. They expect that analysis of market-based instruments and private sector participation as solution to efficient human resource use in industry to resolve energy development related problems in the new millennium. They rarely participate in voluntary and flexible community group activities related with capacity development.

Majority of them feels that reliable, affordable and efficient use of man power resources along with policy of effective management systems are important to economic and social development and improved quality of life. Survey shows that there is lack of education & training and data collection system.

The comparison of responses between the Libya and different countries show different viewpoints. The cross-disciplinary global organization responses have helped to suggest policies and strategies for job turnover reduction in support of sustainable development. Best practices evolved from other countries have potential for its application in Libya.

Finally the study shows that a much larger sample is needed if we are to come up with both energy industry specific and area specific conclusions. Many of the problems discussed in Tripoli are common to many areas in Libya and other MENA countries alike. A brief outline of the problems under the theme and the issues identified is as below:

6. DISCUSSION OF RESULTS FROM MANPOWER PLANNING SURVEYS FOR JOB TURNOVER REDUCTION IN ENERGY INDUSTRY IN LIBYA

Most respondents feel that there is need to develop proper manpower policies, which fit the oil, & gas sector needs and are flexible enough to meet to demand. It should also examine Labialization program within the overall manpower planning system under various sets of policy conditions. Much state that appropriate manpower planning system can help provide a means for improving management decisions in the long terms. All feel that causes of turnover in Libya are related to the same factors that contribute to brain drain, absenteeism and low morale. Most people leave because of low salary making them uninterested in their jobs. As and when they find better job offers they leave.



Responses show that being unhappy in a job is not the only reason why people leave one company for another. If the skills that they possess are in demand, they are lured away by higher pay, better benefits, or better job growth potential. Manpower planning sections of most oil companies can't control what's happening with other companies, how much they pay, or which benefits they offer. Most respondent feel that there is need for taking steps to improve morale and make those employees who are with us happy and productive. They all feel that it's important to know and recognize the difference between employees who leave because they are unhappy and those who leave for other reasons.

Following are some of the more common reasons for high turnover in energy industry in Libya:

A Bad match between the employee's skills and the job. Most employees in energy sector in Libya who are placed in jobs that are too difficult for them or whose skills are underutilized become discouraged and quit. The main reason identified is inadequate information about skill requirements that are needed to fill a job that result in the hiring of either under skilled or overqualified workers. Almost all respondents feel that there is a need to identify the requirements of a specific job. It should be carefully studied for the required skills, and workers should be tested for the requisite qualifications. Almost all feel that use of job analyses job descriptions would help to minimize the chances of this happening.

Substandard equipment, tools, or facilities. Some of the respondents feel that one of the reason for high job turnover is working conditions that are substandard. Some of the desert workplace lacks important facilities such as proper lighting, furniture, restrooms and other health and safety provisions. This prompts employees as unwilling to put up with the inconvenience for long.

Lack of opportunity for advancement or growth. Most respondents feel that one of the reason to reduce job turnover is that if the job is basically a dead-end proposition, this should be explained before hiring so as not to mislead the employee. The job should be described precisely, without raising false hopes for growth and advancement in the position.

Feelings of not being appreciated. A few respondents feel that since employees generally want to do a good job, it follows that they also want to be appreciated and recognized for their work. Even the most seasoned employee needs to be told what he or she is doing right once in a while. Therefore, there is a need to make sure that employees know that they are appreciated.

Inadequate or lackluster supervision and training. Almost all respondents feel that employees need guidance and direction. New employees need extra help in learning an unfamiliar job. Similarly, the absence of a training program does cause workers to fall behind in their level of performance and make them feel that their abilities are lacking.



Unequal or substandard wage structures. Almost all the respondents have reported that inequity in pay structures or low pay are great causes of dissatisfaction and can drive some employees to quit. Again, most new worker wonder why the person next to him is receiving a higher wage for what is perceived to be the same work. Therefore there is need that employees have a wage and job evaluation system in place not only so that they are sure to comply with equal pay for equal work requirements, but also to avoid this problem.

Based upon the views of most respondents survey results show that following steps are vital and urgently needed for tracking turnover:

Keeping a list or file of employees that leave. The file should include: the length of time that the employee worked, the position that the employee held and the reason that the employee left. Paying attention to overtime matters including information on positions that have trouble keeping filled. Finding that do employees tend to stay for the same length of time before they leave. Finding that do employees stay after receiving more pay or a more responsible position)? Redesigning a job by adding more attractive duties and reassigning some less desirable ones. Getting some information about what other businesses are paying for similar positions. Finding if people are leaving because positions elsewhere allow them more growth, Looking closely at the working conditions

Finding that if the employees in position are forced to adhere to impossible deadlines, given all the worst tasks, or forced to work with difficult customers or employees.

6.1 Preventing Turnover

Survey highlights the need to take following measures to ensure that employees remain with the companies: Identify the positive aspects of the business that make employees want to stay.

Emphasize those aspects. Internal factors that may influence employees' desire to stay are: benefits, pleasant working conditions, opportunity for growth/advancement, pay and job security.

In addition to the internal factors that make employees want to leave or stay, there are also outside factors that can influence turnover. One can't do much about these factors, which include family responsibilities, financial obligations, marketability of their skills, and jobs offered by other companies. What one can do is try to make the job as desirable as possible, to minimize the chance that external factors will lure workers away.

To minimize unwanted turnover it is necessary to give employees perks that are perceived by them as benefits that "make or break" a job. Trade on strong points. Job perks like flexible hours or better-than-average benefits might keep employees in a job that they would otherwise leave. Attempt to make work fulfilling and rewarding for employees.

Sometimes the jobs that you have may not be particularly exciting or offer a great potential for growth, but they are still important and must be done. So how can you handle this sticky situation? Some possible options are to hire temporary employees, or to use part-time workers who are simply looking for a low-effort paycheck.



6.2 Turnover Costs

Monetary and hidden costs associated with employee turnover are also of concern. When an employee leaves a business, it costs company in:

Productivity. When the employee leaves, productivity will usually take a downturn because other workers may have to add the former employee's duties to their own workload, at least temporarily.

Money. In addition to the monetary costs associated with lower productivity, one may have to pay employees overtime to get them to take up the slack left by the former employee until a replacement can be found. One may also have to face unemployment claims and pay for the cost of recruiting and hiring a replacement.

Time. It is a distraction from regular duties to cover for a former employee. Also one has to spend time and money advertising, interviewing, and otherwise looking for a replacement employee. In addition it is the time that one spent training and hiring the former employee. Thus we lose a lot of employees, wasting time and money.

A new employee, causes flagging productivity while the employee learns his or her new job. Sometimes, depending on the job, temporary employees can pick up the slack. In other words, it costs the business money every time an employee leaves because it takes even more resources to return to the same level of productivity or level of performance that was before. . Sometimes, though, if the worker in question was a problem performer, productivity may not suffer. In fact, in such a case it may be better off than if the dissatisfied employee had stayed on the job. On the whole, it is advisable to prevent turnover as much as possible because of the high costs associated with it.

7. CONCLUDING REMARKS

Paper presents an overview of competency assurance process to prepare man power plan for petroleum industry sector and job turnover reduction scenario in Libyan oil & gas sector of national economy. It shows, that in the current scenario, it is possible to maintain the required manpower levels when international markets are used to overcome manpower shortages. The continuation of the current practices, however, might inhibit the oil & gas sector from building and improving the experience level and restrict replacements at the management levels. As evident during last five years manpower growth trends in petroleum industry indicate that intake and exit, nature of services, skill level, geographical location, composition are not regular undefined and do not indicate a consistent growth pattern. A brief account of how human resource needs are determined, how to find good people to fill the jobs, job selection processes and type of training and development opportunities that the Libyan organizations offer to their employees is given. It describes that how job turnover can be effectively reduced by basing professional research linking job characteristics to job candidate sources of personal discomfort and dissatisfaction. It highlights the impact of new information and communication technologies and the three major challenges that will influence future development: changing competitive pressure, growing social divide, and changing demography. It demonstrates that job turnover is not a concept that is unattainable. Simply simply gaining the commitment and dedication from employees can drastically reduce it.



Internal factors that influence employees' desire to stay in Libya are: pleasant working conditions, opportunity for growth/advancement, pay and job security. Based upon an analysis of number of responses from a comprehensive questionnaire it demonstrates that it is best to develop prevention methods such as dept hiring/selection process or exit interviews that allow them to sustain employees.

Survey shows that oil & gas industry has become more knowledge based with higher ICT investment having characteristics of speed, quality, flexibility, knowledge and network. It has more significant impacts and directions to make University/ Petroleum Training & Qualifying Institute as vital centers to promote human interaction and innovation especially in the field of integrated oilfield development and management. Success of these centers depends upon how much value we add at every point of service and program and how much we can be entrepreneurial, creative, flexible and proactive to change in all aspects of management and operations. Collaborations and initiatives are needed to accurately measure the past and existing turnover and analyzing the cost associated with turnover through Institute, Industry Interaction. Under the current employment legislation and the pressure to improve the skills to attain Libyanisation targets, it is vital to adopt manpower-planning system. It would help facilitate the adoption of the appropriate manpower strategies to achieve the desired objectives. Role model of Higher Institute, Libya is briefly outlined to show the Best Practices Program forming part of such a strategy. Lessons learned on job turnover reduction issues to attain employee loyalty and commitment have immense potential to develop and use system models to make better predictive models for its application in manpower planning for petroleum industrial establishments and oil & gas management.

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PUBLIC ENVIRONMENTAL ATTITUDES IN TURKEY

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Public environmental attitudes as one of the components of the environmentalism have been investigated for many respects. Public environmental values have been assumed as responses of people to given environmental issues or circumstances. The given issues or circumstances might be economical, developmental, industrial, scientific or anything related to environment. In this respect, public environmental values extensively have been investigated in the western countries and lesser extend in the non-western countries.

Turkey is as a developing country that environmental issues have taking more public attention for last few decades in there. Therefore, an environmental awareness has been emerging in Turkish public. This present research aims to investigate public environmental values in Turkey.

There are two main stream perspectives to evaluate relationship between society and the environment in the environmental sociology literature: The anthropocentric worldview and the eco-centric worldview. The anthropocentric worldview mainly underlines that human-being is the dominator of the natural environment and natural environment has valued for human usage. On the other hand, according to the eco-centric worldview, natural environment has valued for not (only) human usage, it is valued for its own sake too. In general, it is assumed that public environmental awareness varies from the anthropocentric form to the eco-centric form. The anthropocentric form of public awareness is more development oriented and by definition human oriented, and the eco-centric form of public awareness is more environment oriented. In this research, however, it is assumed that Turkish people's environmental attitudes are in between of the anthropocentric form and the eco-centric from of public awareness.

This research is an applied field research conducted last summer in Turkey. The research population is all Turkish population with aging over 18 years old and non-institutionalized. The research sampling is 1028 and assumed to represent all Turkish population. The sampling technique used in this research is a multi-stage stratified sampling. The data collected by using face-to-face interview and the interview questionnaire has been constructed with fully structured close-ended questions.

Key words: *environmental sociology, environmental attitudes, anthropocentrism, eco-centrism, Turkey.*



1. Introduction.

Environmental problems and environmental issues have become one of the most important problems and issues in the late modernization age. Earlier, environmental problems have been accounted as technical and economical problems; however, these problems have been accounted as their societal dimensions as well as technical and economical dimensions for last few decades. The societal dimensions of environmental problems and environmental issues attracted more public attention and social scientific concern in the second half of the twentieth century, especially after the 1970s. A new social scientific discipline, “environmental sociology” has been appeared as a result of mentioned circumstances. Environmental sociology hammered multi-dimensionality of environmental problems and environmental issues, especially social dimensions. Accordingly, environmental sociology is such a discipline that accounts social dimensions of the environmental problems.

The investigation of environmental attitudes is one of the areas of environmental sociology. In this respect, public environmental attitudes have been investigated in more and less developed countries for last few decades. The investigation of public environmental attitudes is common in the developed western countries; however, it is not so common in the developing or less developed countries. Environmental issues are increasingly taking more public attention in Turkey for last decades. Therefore, an investigation of public environmental attitudes in Turkey is the major concern of this presented paper.

The paper is based upon an empirical field research. The empirical research was conducted in Turkey as a nation wide study. The research was conducted in Turkey last summer. The research population was all Turkish population with aging over 18 years old and non-institutionalized. The research sampling is 1028 and assumed to represent all Turkish population. The sampling technique used in this research is a multi-stage stratified sampling. The data collected by using face-to-face interview and the interview questionnaire has been constructed with fully structured close-ended questions.

Before discussion of environmentalism and environmental attitudes, a historical and theoretical evaluation of society-environment relationship accomplished.

1.1. A historical and theoretical evaluation of society-environment relationships.

There is close association between socio-economic reproduction type and society environment relationships. The history of society-environment relationships shows three stages of these relationships. These stages are hunter-gatherer societies, agricultural societies, and industrial societies.



According to Harper, “a cognized environment is part of the cultural worldview -the totality of cultural belief systems about the world and reality that people share. A cognized environment is also an important component of the paradigms that people share.... A social paradigm is an implicit model of how the world works that is broadly shared by people in society” (Harper, 1996:36). A social paradigm affects society’s institutional structure, moral values. Every society has competing paradigms with one tending to dominate. Although the Dominant Social Paradigm (DSP) is not necessarily the only paradigm in a society, it is supported by the elite of social systems and provides an effective worldview (Harper, 1996:36; Milbrath, 1984:7-9). The DSP culturally and socially legitimates society’s worldview by defining social structure and culture.

As Lenski (1966) and Harper (1996) noted, each society creates exclusive power structures, division of labor, exploitation and surplus structures, and environmental relations. Historically, each society has created an exclusive relationship with the environment and a dominant social paradigm that legitimizes the relationship between society and the environment. The relationship of each society with the environment, dominant social paradigms of these societies, and power structures are discussed in a historical context. Three main types of societies and their relationships with environment were given a historical perspective.

1.1. a. Hunter-Gatherer Societies

Hunters-gatherers were the earliest type of human society appearing approximately 40,000 years ago (Harper, 1996). Hunter-gatherers lived as small bands, survived by gathering edible wild plants and killing animals from their close surroundings. They collected their foods on daily or weekly basis, so they could not accumulate long run economic or food surplus. “They survived by the accumulation of a cultural stock of ‘expert knowledge’” (Lenski, 1966; Harper, 1996:37). The “expert knowledge” includes knowing food availability of their close surroundings, including knowledge about soil, water, air, and plant.

Social and organizational structures of hunters-gatherers were not so complicated. They consisted of a simple division of labor and their status-role system was based primarily on age and gender. Relationships between members of the society were face-to-face and informal and there was at its lowest level inequality because there was a very little surplus value accumulated (Lenski, 1966; Harper, 1996:37).

The relationship between hunter-gatherer societies and environment was a direct relationship compared to modern societies. Due to the smallness of societal population and local and decentralized social patterns, impact of hunter-gatherers on environment was characteristically limited and localized. Hunter-gatherer societies developed a strong association with nature which nurtured a dependence on nature and other societal members. This dependence on nature was at the core of hunters-gatherers’ dominant social paradigm. They thought of themselves as “as people in nature.” “Their cognized environment was that of a living natural world (wilderness/ jungle/ forest/ grassland) of things and beings governed by spiritual forces” (Harper, 1996:38).



1.1. b. Agricultural Societies

Human beings discovered cultivation of crops and domestication of animal about 10,000 years ago. Irrigation, fertilization, and organization of labor accelerated agricultural production in later stages of agricultural societies. Innovation of more advanced agricultural technologies such as the metal plow, pulled by domesticated animal, enormously increased agricultural production and radically changed social life in agricultural societies. Division of labor became more significant in social life and a peasantry appeared as the main force of production. Additionally, artisans appeared as creators of agricultural and other tools, and administrative class appeared as organizer of production and surplus. However, 90 percent of the population was peasant in agricultural society (Harper, 1996:39).

The appearance of agricultural society is not only depended upon the discovery of cultivation of crops and domestication of wild animals, but also upon manipulation of the natural environment. The agricultural cultivation, irrigation, and fertilization changed the natural environment and society's relation to the environment. Forests and wilderness were transformed to cultivated lands. Furthermore, irrigation and fertilization changed soil composition. This symbolized that the alienation of human beings from the natural environment.

This accumulation created a huge inequality between leading classes and the forces of production. Manipulation, overuse of natural resources, and exploitation of nature for agricultural production were the main environmental premises of agricultural society. Moreover, first urban settlements of human history were established in agricultural society. Urban settlers of agricultural society seem to be "uprooted" from their cultural and natural "roots" compare to hunter-gatherers' holistic life style in the natural environment. The dominant social paradigm in agricultural society was based upon exploitation, manipulation, and domination of environment. The DSP of agricultural society legitimated human domination on the environment and exploitation of nature. "If the cognized environment of hunter-gatherers was of a natural living wilderness, that of agriculturalists were more like that of a garden, still a natural system on which people depended, but one that could be extensively cleared, plowed, weeded, tended, watered, mined, and dominated for human purposes" (Harper, 1996:43).

1. 1. c. Industrial Societies

Industrialization started about 300 years ago in Western Europe. Industrialization was based upon some key innovations including the development of the textile industry in England. Discovery of the steam engine, electric power, hydroelectric power, and petroleum were also important contributors to industrialization. Development of these new energy sources and production technologies enormously increased industrial production and surplus. Invention of new technologies and increase in production required more centralized social organizations. The centralization and reorganization of production radically changed people's daily life. People accumulated in industrial centers, and eventually majority of the population began to live in urban industrial centers for the first time in human history. Increased urbanization was accompanied by a significant expansion in political and economic bureaucratization (Lenski, 1966; Harper, 1996; Wallerstein, 1976).



The Western industrial nations established industrial empires. These industrial Western countries imported raw materials and natural resources from undeveloped countries, and they re-exported these materials as manufactured goods to undeveloped countries. Expansion of industrialization to an international level also expanded environmental exploitation.

Environmentally, industrialization is based upon the exploitation of natural resources. The vital change in the human-environment relationship was the common usage of cheap fossil fuels in industrial society (Lenski, 1966; Harper, 1995:45; Catton, 1980). Using fossil fuels resulted in more extensive exploitation of natural resources, more pollution, and greater environmental destruction. Some immediate results of using fossil fuels were air and water pollution, acid rain, and global warming (Keleş, 1997; Keleş & Hamancı, 1997; Tuna, 1998).

Industrialization also increased domination of humans over other species. Clearing exotic species and natural environments were acceptable to establish industrial plants and to increase industrial production.

After this short historical review, conceptual framing and clarification about environmentalism and environmental attitudes will be presented.

2. Conceptual mainframe

2.1. Environmentalism

Environmentalism has a cumulative meaning that includes environmental action, environmental movements, environmental politics, and environmental attitudes. Harper (1996) indicates that environmentalism is both ideology and action; “as ideology, it is a broad set of beliefs about the desirability and possibility of changing the human relationship with the environment” (1996:293). According to this definition environmentalism includes environmental beliefs and attitudes. Environmentalism is a total perception or worldview within a society on environmental relations.

Historically, environmentalism as a social movement and political ideology varies from the anthropocentric pole to the eco-centric pole. Resource conservation, human welfare ecology, preservation, animal liberation, and eco-centrism are major environmentalist streams (Eckersley, 1992:34). The resource conservation movement basically advocates conservation of natural resources for better usage. Human welfare ecology targets a clean, safe, and more pleasing natural environment for human being. The preservation movement advocates reservation of wilderness for human enjoyment. Accordingly this movement, like the resource conservation movement and the human welfare ecology movement, is human centric as well. These three environmental streams are anthropocentric streams. According to these streams, environment has instrumental value for us. These environmental streams are confirmed by the dominant social paradigm of industrial society. However, according to modern environmentalism, nature should have been valued for its own sake (Eckersley, 1992:42; Naes, 1995).



2.2. Environmental Attitudes

Environmental attitudes are recognized as an indicator and component of environmentalism. Environmental attitudes are generally accepted as responses from respondents for given environmental issues. Environmental issues might be environmental degradation, environmental pollution, the relationship between society and environment, environmental politics, etc. Positive or pro-environmentalist attitudes of respondents might be called environmentalism. The aim of environmentalism as an ideology is to change environmental attitudes to more pro environmentalist structure (Harper, 1996).

The research on environmental attitudes is common in the Western countries especially in the United States; however, it is not so common in the non-Western countries such as Turkey. Even if environmental attitude research is common in the Western countries these researches consist of number of sampling, conceptualization, and measurement problems. The number of researchers dealt with these research problems about the environmental attitudes.

2.3. Conceptualization, Measurement, and Sampling Problems of the Environmental Attitudes

There are many theoretical and empirical approaches to investigate environmental attitudes in the literature (Dunlap and Van Liere, 1978, 1984; Buttel and Johnson, 1987; Ramsey and Rickson, 1976; Mohai and Twighht, 1987; Freudenburg, 1991; Arcury, 1990; Buttel and Flinn, 1974; Tarrant and Cordel, 1997; Cottrel and Graefe, 1997; Arcury et al., 1986). Although, conceptualization and operationalization of environmental attitudes varies in and across studies, most approaches identify environmental attitudes as a component of environmentalism. Most of the environmental attitude studies have been conducted since 1970 when conceptualization of environmental attitudes as a scientific research concept gained closer attention by researchers (Dunlap and Van Liere, 1978).

Dimensionality and sampling were two of the most critical factors of environmental attitude research. Initial research looked at environmental attitudes as a unidimensional concept. However, later studies explored the multi-dimensionality of the concept (e.g. Albrecht et al., 1982). Present environmental attitude research is based on community, state, or national level samples. Theory on environmentalism and environmental attitude indicates globalization of environmental issues. Environmental issues are problematic for the Western and the non-Western countries. Environmental issues such as environmental attitudes are important socio-environmental subjects the non-western countries such as Turkey.

This study conceptualizes environmental attitudes as multi-dimensional, and the study is based upon a national data collected in Turkey. This chapter presents a conceptualization of environmental attitudes.

Conceptualization of Environmental Attitudes: Environmental attitudes are related to environmental problems. Environmental values, the relationship between the environment and society, and perceptions of natural source consumption directly affect overall environmental balance (Dunlap and Van Liere, 1978). Environmental attitudes are perceptions or values about given environmental issues. Environmental issues include the relationship between environment and society, effects of economic growth and technology on the environment, environmental degradation, air and water pollution, green house effect, global warming and numerous other environmental problems.



Dimensionality: Early environmental attitude studies measured environmental attitudes as a uni-dimensional phenomenon. The New Environmental Paradigm (NEP) index (Catton and Van Liere, 1978) was an early measure of environmental attitudes and it was considered to be uni-dimensional. Twelve questionnaire items of the NEP index included statements about population, economic growth, pollution, and other issues. Originally, the NEP index was applied to two samples; a General Public Sample (GPS) and an Environmental Organization Sample (EOS). The researchers assumed that the 63 EOS sample was more knowledgeable and would score higher on the NEP than the GPS. Comparisons between two groups confirmed that the EOS environmental attitude scores were significantly higher than those of the GPS. Dunlap and Van Liere concluded that the index accurately measured respondents' environmental attitudes.

The NEP index was used by other researchers (Geller and Lasley, 1978; Archury et al., 1986; Albrecht et al., 1982; Tarrant and Cordell, 1997) who tested the index's validity and reliability using data from different samples. Research results generally indicated that the index was reliable and valid, although there were some criticisms. The main critique concerned the dimensionality of the index. Albrecht et al. (1982) used the NEP index and using factor analysis found three dimensions: 'balance of nature', 'limits to growth', and 'man over nature' (1982:41).

In a later study, Dunlap and Van Liere (1984) also found multi-dimensionality in environmental attitudes. They constructed a 29-item index that yielded eight factors (dimensions). Buttel and Johnson's research on environmental attitudes also found multiple dimensions. They conceptualized environmental attitudes as 'ameliorative' environmental concern and 'societal redirection' environmental concern (1977:56). The amelioration dimension represented more or less passive environmental concern of respondents for a given environmental situation. Societal redirection represented more active environmental attitudes aimed at changing environmental conditions.

Cluck et al. (1997) discussed multi dimensionality, conceptualization, and measurement problems of environmentalism. They used a United States nation-wide data and constructed a 32-item environmentalism index and acknowledged the following: dimensions 'environmental worldview', 'environmental concern', and 'environmental commitment'. Building upon previous studies of environmental attitudes, this research considers the dimensionality factor. Following Cluck et al. (1997), environmental attitudes have been conceptualized as a three dimensional concept. The dimensions of environmental attitudes include environmental worldview, environmental concern, and environmental commitment. The meanings of these three dimensions are conceptualized as follows. Environmental worldview represents basic and general form of environmentalism (environmental values) of the respondents. This form of environmentalism indicates respondents' general perceptions about the environment, relationships between the environment, economic growth, and industrialization, and effects of science and technology on the environment. Environmental concern represents values of respondents about the relationship between the environment and society and relationship between individual and the environment, and perceptions of respondents about specific environmental problems. Environmental commitment represents values of respondents about commitment issues for better environmental quality. The environmental commitment issues might include willingness to pay higher taxes or costs for



better environmental protection and willingness to reduce living standards to achieve a higher environmental quality.

Sampling:

In addition to dimensionality, sampling has been another important issue in the environmental attitude research. Most environmental attitude studies in the United States have been based on state, community, or special environmental group samples. Most of the research is based on random sampling, however, samples represent limited population such as environmentalist groups, students, and community leaders. Riley Dunlap (1975) conducted a survey based on a randomly selected sample of 300 University of Oregon students. Buttel and Flinn's (1978a; 1978b) studies were based upon randomly selected Wisconsin state samples. Ramsey and Rickson's (1976) study consisted of a Wisconsin high school student survey. Buttel and Johnson (1977) investigated Wisconsin community elites' environmental attitudes. Dunlap and VanLiere's (1978) New Environmental Paradigm index was based on a survey of two samples of Washington state; general public sample and state environmental organization sample. A later study by Dunlap and Van Liere (1984) was based on a Washington state general public sample. Albrecht and Bultena (1982) compared environmental values of Iowa farm sample and Iowa urban sample. Arcury et al's (1986) study was based upon a Kentucky statewide sample. Freudenburg's (1991) rural-urban comparison study consisted of four community samples in Colorado. Tarrant and Cordell's research (1997) was based on random dialing sample of Southern Appalachian residents (the south of the Potomac River and the mountain regions of Virginia, West Virginia, North Carolina, South Carolina, Tennessee, Georgia, and Alabama). Most of the environmental attitude research is based on random sampling; however, these samples only represent limited groups such as university students, community leaders, and environmentalist groups. The literature indicates that almost all environmental attitude studies are limited to regional samples (community, geographic area, state). The findings and generalizations of these studies have been limited and have not allowed national or international generalizations. Therefore more national level data necessary to understand national level environmental attitudes.

The multi-level conceptualization of environmental attitudes and investigation of them in the non-Western countries has rarely been done. Most surveys of environmental attitudes have been state level surveys conducted in the United States. Due to fact that making national level and international level generalizations implausible (Dunlap and Van Liere, 1978). A conceptualization and application of environmental attitudes study in a non-Western country provide an important contribution to our understanding of environmentalism. This environmental attitude study conceptualizes and predicts environmental attitudes as multi-dimensional phenomena using a national sample.

Background Correlates of Environmental Attitudes: The effects of individual factors on environmental attitudes have been empirically examined since the 1970s. Literature suggests that age and education are two of the most explanatory variables related to environmental attitudes. The literature indicated that gender, residence, income, and political tendency are also predictors of environmental attitudes (Arcury, 1990; Buttel and Flinn, 1974; Tarrant and Cordell, 1997; Cottrell and Graefe, 1997; Buttel and Johnson, 1977; Dunlap and Van Liere, 1978; Arcury et. al., 1986; Albrecht, 1982; Ramsey and Rickson, 1976; Mohai and Twight, 1987; Freudenburg, 1991; Inglehart, 1995a; Bowman 1977; Buttel and Flinn, 1978a, 1978b;



Dunlap 1975; Stern et al., 1993). However, environmental attitude research indicated contradictory results.

All reviewed literature indicated that education is a key variable on environmental attitudes. Almost all research on environmental attitudes found that highly educated respondents always have more pro-environmentalist values than lower educated respondents (Inglehart, 1995a, 1995b; Arcury, 1990; Flinn, 1978a, 1978b). Environmental knowledge and education are closely associated each other. An understanding of modern environmental issues requires high level of environmental knowledge, and likelihood of high environmental knowledge is correlated to high level of education (Inglehart, 1995a; 1995b; Arcury, 1986; 1987; 1990). The effect of education on environmental attitudes is not only direct, its effect is also indirect.

Education confounds the effects of age, residence, income, and political tendency on environmental attitudes. These will be discussed in latter sections of this chapter.

Age is another factor that affects environmental attitudes. Younger persons are more environmentally concerned than older persons (Arcury, 1990; Inglehart, 1995a) because environmentalism is an appropriate outlet of younger persons' relatively low commitment to the social order and lower regard of dominant value system.

Some scholars such as Tarrant and Cordel (1997), Stern et al., (1993), Arcury (1990) discussed gender effect of environmental attitudes. Their findings have been contradictory. Arcury (1990) found that female respondents were less environmentally concerned than male respondents and Tarrant and Stern (1977) and Stern et al. (1993) reported that female had higher levels of environmentalism than males. Over all, findings have indicated no clear gender difference on environmental attitudes. Because different researchers used different samples each research limited to its sample.

As emphasized earlier, the effects individual demographic characteristics are correlated to each other. Buttel and Flinn (1978) reported that the effects of education, income, and occupation on environmental attitudes were interrelated with age and residence. They found that urban residents were more environmentally concerned than rural residents because urban residents seem to be more likely affected by environmental problems (air and water pollution etc.) than rural residents. Buttel and Flinn concluded that "the well educated, tend to be young and urban residents suggest that much of the gross effect of education on environmental beliefs might be spurious" (1978:437). On the other hand, Freudenburg (1991) noted that environmental attitudes of rural residents were different from general assumptions: the environmental attitudes of rural residents depended on their economic activities. These findings indicated that persons in agricultural sector have higher environmental concern than other rural persons in the same communities.

The relationship between environmental attitudes and social class is also debatable and confounded by education --environmental knowledge-- (Arcury, 1987; 1990). Buttel and Flinn noted that environmentalism was most likely a middle or upper middle class phenomenon. However, they added, the effect of social class on environmental attitudes has been confounded by education. Highly educated middle class respondents were more concerned about environment than that of their lower educated counterparts (1978:434).



Generally, middle class respondents were more concerned about the environment than lower and higher class respondents.

Political tendency has found another predictor of environmental attitudes. Most of the literature indicated that political-ideological tendency was a better predictor of environmental attitudes than political party preference. Generally, Democratic Party supporters were more concerned about the environment than Republican Party supporters (Dunlap and Van Liere, 1978; Dunlap, 1975). However, Buttel and Flinn (1978a, 1978b) and Buttel and Johnson (1977) noted that political preference was confounded by education. Highly educated and professional Democrats were most likely pro-environmentalist; however, industrial working class democrats were more concerned about economic welfare than the environment. Buttel and Flinn (1978a, 1978b) mentioned that the distinction between 'political liberalism' and 'laissez-faire liberalism' was more meaningful distinction than republican-democratic distinction. Therefore, they concluded that politically liberal respondents were more concern about environment than laissez-faire liberal respondents.

Some scholars such as Harold Inglehart have looked at environmental attitudes from a broader perspective. Inglehart (1995a, 1995b) notes that environmentalism is a postmodernist, postmaterialist phenomenon in the Western developed countries. He defines main social values of societies as materialist values and postmaterialist values. He defines materialist values as production, welfare, affluent, and growth, and postmaterialist values as consumption, freedom of speech, cultural and ethnic heterogeneity, equality, and quality of life. He notes that recent forms of environmentalism appear as a postmaterialist phenomenon with a cultural shift from 'materialist values' to 'postmaterialist values' especially in developed countries. According to Inglehart, education (knowledge) is the most important factor for this cultural shift and the appearance of ecological environmentalism. Therefore, individual environmentalism and/or environmental concern is highly correlated with individual resources (income and especially educational knowledge). According to this model, postmaterialism is correlated to socio-economic development level. In other words, postmaterialist values are more common in the developed countries than in the developing countries. Inglehart explains relationship between environmental attitudes and postmaterialism within individual level and societal level. Inglehart believes that environmentalism and environmental concern appear as a function of post-materialist values among highly educated middle class people, and as a function of environmental threat among low educated classes. He also explains that environmentalism is most likely a post-materialist value, as a function of high education level and affluence in developed countries, and it is less likely post-materialist value and more likely environmental threat phenomenon in developing countries.

Inglehart also recognizes that individual factors and socio-cultural factors are almost equally effective on 'public support for environmental protection.' His final remark about the relationship between individual factors and socio-cultural factors on the environmental values is that individual (postmaterialist) values are more and primarily effective on the environmental values (1995a:67-69).



The social origins of environmental attitudes have been investigated by Hays (1987). His position agrees with Inglehart in that environmental interests of the Western people have changed from conservation, production, and growth oriented values to consumption and quality of life oriented values (1987:35). Hays refers to Inglehart's earlier study, "Silent Revolution," (1977) in which Inglehart discussed the tendency of environmental attitudes to change from conservation-production-growth orientation to consumption-quality of life orientation. However, Inglehart recently labeled that change of tendency as change from materialist values to postmaterialist values (1995a, 1995b).

Therefore, reviewed literature indicated that gender, income, age, residence, education, and political orientation are the most commonly used demographic independent variables to predict environmental attitudes. However, findings are contradictory because environmental attitude studies are generally state or community level studies, and the studies have been drawn from a variety of samples such as college students, members of environmental organizations, community elites, state and nation wide samples. The same predictors indicate different effects on environmentalism for different samples. Therefore, the contradictory findings about these predictors are probably related to sample limitations.

3. Methodology, Data and Measurement

The defined three dimensional environmentalism model used to test public environmental attitudes in Turkey. The empirical research was an applied field research and conducted in Turkey. The data collection technique was facet-to-face interview and the questionnaire was fully structured with close ended questions. The research was accomplished the summer of 2003. The research population was population of Turkey aging over 18 year-old and non-institutionalized and the research sample size was 1028. The sampling model was multi-stage stratified sampling. Initially, the Turkish population was divided by seven strata units that are the seven geographical regions of Turkey. Then nine counties of Turkey were selected to represent seven geographic regions: Ankara represents the Central Anatolian region; İstanbul represents the Marmara region; İzmir and Muğla represent the Egean region; Antalya represents the Mediterranean region; Erzurum represents the East Anatolian region; Mardin represents South-East Anatolian region; Trabzon and Tokat represent Black Sea region. At least one urban and one rural settlement were selected to represent each county in the next stage. Finally, the sampling units were randomly selected for each settlement unit to represent the given settlement unit.

The data consists of information about various topics regarding the environment. Respondents were asked to comment on environmental issues including the role and function of science and scientific solutions to environmental problems, the relationship between development and economic growth, environmental protection, environmental regulations, and health related environmental issues such as radiation and pollution. The questionnaire items also include environmental policy, government functions on environmental protection, and deep ecological issues such as animal rights and the Gaia hypothesis (Lovelock, 1991).



Dependent Variables: Three dimensional environmental attitude index is constructed for this study. The dimensions of environmental attitudes are environmental worldview, environmental concern, and environmental commitment (Cluck et al., 1997, Tuna, 1998). Exploratory factor analysis (Table1) and internal consistency reliability (Table 2) test have been accomplished to construct this index. Factor analysis identified three constructs --three dimensions of environmentalism.-- Items selected for each construct which had factor loadings higher than 0.5. Accordingly, 30 items with three constructs were selected. Exploratory factor analyzes results were presented in Table 1. The results indicated that selected items are good indicators of the constructs. The reliability of the three constructs tested by an internal consistency reliability test. The test results presented that the three constructs are highly reliable (see Table 2). The three constructs represent three dimensions of environmental attitudes; worldview, concern, and commitment (see Table 3).

The index items were measured as 1 to 5 Likert type scale. Original survey items were coded 1 to 5 scale: (1)=strongly agree, (2)=agree, (3)=neither agree, nor disagree, (4)=disagree, (5)=strongly disagree. However, the categories were recoded as (1)=strongly disagree, (2)=disagree, (3)=neither agree nor disagree, (4)=agree, and (5)=strongly agree for logical consistency. The recoded response categories indicate that (1) is the lowest level of response and (5) is the highest level of response for given environmental issue.

Hypotheses.

1. Because of the fact that their direct dependency to the natural environment, people who live in rural area are identified themselves were much more concerned about the natural than people who live in urban area.

	Component		
	Concern	WV and En.	Commitment
V8A	8.080E-03	.138	.776
V8B	1.457E-02	.242	.766
V8C	3.925E-04	.285	.743
V9B	6.000E-02	2.633E-02	.650
V12A	.581	4.556E-02	.199
V12B	.597	7.048E-02	.153
V12C	.563	.149	.104
V13A	.435	.242	-.194
V13B	.539	.268	-.215
V14A	.633	.248	-6.180E-02
V14B	.677	.275	-.163
V15A	.676	.162	-2.153E-02
V15B	.700	.164	-3.410E-02
V16A	.672	-6.353E-02	.163
V16B	.690	-1.069E-02	.122
V17A	.591	2.636E-02	5.126E-03



V17B	.619	.107	-1.128E-02
V30A	5.228E-02	.519	.141
V30B	-1.787E-02	.567	.275
V30C	9.726E-02	.483	6.639E-02
V30D	6.014E-02	.601	-6.328E-02
V38A	5.863E-02	.640	1.782E-02
V38B	.101	.664	9.384E-02
V38C	.150	.601	-5.285E-02
V38D	.146	.599	-.125
V43A	.141	.532	6.383E-02
V43B	.150	.604	.263
V46A	.157	.524	.233
V46B	.148	.461	.223
V46C	.132	.451	.251

Table: 1. Exploratory Factor Analysis (Three dimensions of environmental values)

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 5 iterations.

Component of WV and En.		Component of Concern		Component of Commitment	
Variable	Alpha Score	Variable	Alpha Score	Variable	Alpha Score
V30A	.4142	V12A	.6119	V8A	.6270
V30B	.4959	V12B	.6440	V8B	.6847
V30C	.4164	V12C	.6186	V8C	.6984
V30D	.4599	V13A	.5778	V9B	.5201
V38A	.5487	V13B	.6446		
V38B	.5589	V14A	.5570		
V38C	.4756	V14B	.6168		
V38D	.4824	V15A	.6344		
V43A	.4922	V15B	.6540		
V43B	.5310	V16A	.5852		
V46A	.4903	V16B	.6240		
V46B	.4565	V17A	.5515		
V46C	.3440	V17B	.6022		

Table: 2. Internal Reliability Consistency Index Values of Three Dimensions of Environmentalism.

Reliability coefficient: 13 items
coefficient: 4 items

Reliability coefficient: 13 items

Reliability

Alpha: .8316 Stan. Alpha: .8339
Stan. Alpha: .8112

Alpha: .8801 Stan. Alpha: .8805

Alpha: .8120



Worldview and Orientation toward Energy Development

v30a	Public fund for campaign to save energy
v30b	Energy tax for next ten years to save energy
v30c	Subsidization for householders to isolation houses to save energy
v30d	Limitation of energy usage to save energy
v38a	Public fund for campaign to limitation of car usage
v38b	Energy tax for next ten years to limitation of car usage
v38c	Environmental tax for private cars to support public transport
v38d	Limitation of fuel usage to limitation of car usage
v43a	Public fund for campaign to limitation of household-garbage production
v43b	More taxes to collect household-garbage
v46a	Public fund for campaign to reduce environmental harms
v46b	Next ten years: tax to environmentally unfriendly products
v46c	Strict environmental rules and regulations to prevent environmental harms

Concern

v12a	Air pollution by cars harms the environment
v12b	Air pollution by cars harms you + family
v12c	Next ten years: more ill-health by air pollution
v13a	Nuclear power stations-environment
v13b	Nuclear power stations - you + family
v14a	Air pollution by industry – environment
v14b	Air pollution by industry - you +family
v15a	Pesticides in farming – environment
v15b	Pesticides in farming - you + family
v16a	Pollution river, lake – environment
v16b	Pollution river, lake -you + family
v17a	Rise in world's temp. – environment
v17b	Rise in world's temp. -you + family

Commitment

v8a	Protect environment: pay much higher prices
v8b	Protect environment: pay much higher taxes
v8c	Protect environment: cut your standard of living
v9b	Protect environment: act environmentally friendly

Table: 3. Three Dimensions of Environmentalism (Dependent Variables)

<u>Variable</u>	<u>Variable Label</u>
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<i>Variable name</i>	<i>Measurement</i>
Age	(1) 18 and lower, (2) 18-25, (3) 26-35, (4) 36-45, (5) 46-55, (6) 56-65, (7) 66 and high
Gender	(0) Female, (1) Male
Residence	(1) Rural (village), (2) Small town, (3) Big city
Education	(1) Illiterate, (2) Literate, (3) Primary Sc., (4) Sec. Sc., (5) High School (6) Higher Ed.
Occupation	(1) House women, (2) Jobless, (3) Worker, (4) Public Servant, (5) Merchant, (6) Professional, (7) Manager
Income	(1) Lower 150 mil. (TL), (2) 150-249 mil., (3) 250-349 mil., (4) 350-449 mil., (5) 450-549 mil., (6) 550 mil. and higher
Duration of Residence	(1) 1-3 years, (2) 4-7 years, (3) 8-10 years, (4) 11-15 years, (5) 15 years and higher

Table. 4: Independent Variables

Independent variable	Dependent variable		
	<u>Worldview</u>	<u>Concern</u>	<u>Commitment</u>
Constant	3.921***	3.890***	3.217***
Age	0.058 (.025)	0.031 (.034)	-0.051 (.032)
Gender	-0.084 (.063)	-0.086 (.088)	-0.056 (.082)
Residence	0.098* (.043)	-0.053 (.059)	-0.075 (.055)
Education	-0.030 (.025)	-0.019 (.035)	0.141*** (.033)
Occupation	-0.110 (.019)	-0.009 (.027)	0.133** (.025)
Income	0.057 (.018)	-0.047 (.0259)	-0.053 (.024)
Duration of residence	0.019 (.021)	-0.016 (.029)	0.072 (.027)
F test	2.098*	2.110*	2.993**
R ²	0.034	0.031	0.042

*p>0.05

**p>0.01

***p>0.001

Table. 5: Regression Coefficients of Three Dimensions of Environmental Attitudes



4. Findings and Discussions

The test results of the research on public environmental attitudes in Turkey presented in Table 5. A multiple regression model constructed to test effects of independent variables (age, gender, residence, education, occupation and income) on the each dimension of environmental values. Initially, the test results indicated that each dimension of the environmental values; mean environmental worldview: 3.921, mean environmental concern: 3.890 and mean environmental commitment: 3.217, are differently constructed. As it has been hypothesized that the environmental worldview represents the highest level, the environmental concern represents the moderate level and the environmental commitment represents the lowest level of environmental values for data represent Turkish population. Because of the fact that the respondents, compare to the environmental concern and the environmental commitment issues, responded highest level to given environmental worldview issues (items including “environmental worldview”), then the environmental worldview dimension indicated highest level of environmental values as the most common form of environmental values (environmentalism). Because of the fact that the respondents, compare to the environmental worldview issues, less favorable about the environmental concern issues (items including “environmental concern”), and more favorable about the environmental commitment issues, then the environmental concern issues indicated the moderate level of environmental values (environmentalism). Finally, because of the fact that the respondents, compare to the environmental concern and the environmental worldview issues, responded lowest level to given the environmental commitment issues (items including “environmental commitment”), then the environmental commitment dimension indicated lowest level of environmental values as the at least common and most specific form of environmental values (environmentalism).

If it has been looked at the effect of mentioned independent variables on the three dimensions of environmental values, following factors should be mentioned. The regression test results indicated that the effects of mentioned independent variables on the environmental worldview ($F=2.098$), environmental concern ($F=2.110$) and the environmental commitment ($F=2.993$) are statistically significant. However, if it has been looked at the effect of each independent variable on the each dimension of environmental values, not so many significant effects identified. The regression test results of the dimension environmental worldview indicate that only the variable of residence significantly affect the environmental worldview. This means that the likelihood of being favorable to the environmental worldview is higher to live in larger residence (to live in a small town compare to to live in a village and to live in a big city compare to to live in a small town). The other independent variables have no significant effect on the environmental worldview. This means that no significant gender difference, income difference, age difference, education difference, duration of residence difference and occupation difference on the environmental worldview.



The overview of the second dimension of environmental attitudes, “environmental concern,” indicates that there is no significant effect of independent variables on the environmental concern. In other words, there is no significant effect of gender, income, residence, age, education, duration of residence and occupation on the environmental concern.

The test result of the dimension of “environmental commitment” on the other hand indicates that education and occupation significantly affect the environmental commitment. This identifies that likelihood of to have higher environmental commitment values are higher among the highly educated respondents than that of respondents who have low level of education. The likelihood of to have higher environmental commitment values are also higher among respondents who have highly prestigious occupations than that of respondents who have low level prestigious occupations. It might also be identified an interaction-effect of education and occupation on the environmental commitment because highly prestigious occupations require higher education. The other independent variables, age, gender, income, residence and duration of residence have no significant affect on the environmental commitment.

The research findings generally support hypothesized model that environmental attitudes are three dimensional. The factor analysis and internal consistency test results confirmed multidimensionality of the environmental attitudes. Variation of the mean environmental worldview (3.921), environmental concern (3.890) and environmental commitment (3.217) scores also identify different construction of the three dimensions.

5. Conclusions

The research on environmental attitudes is common in the Western developed countries; however it is so common in the non-western countries. This present environmental attitude study is the first nation wide study accomplished in Turkey. This research has been accomplished in Turkey in the summer of 2003. The research includes environmental issues such as environmental politics, environmental knowledge, environmental degradation, environmental pollution, energy usage etc.

The research deals with the theoretical, conceptual, sampling and dimensionality problems of environmental attitude research. The conceptualization and dimensionality of environmental attitudes are one the important problems of the environmental attitude research. Early environmental attitude studies conceptualized environmental attitudes as uni-dimensional. However, critics of these studies identified the multi-dimensionality. After that the research on the environmental attitudes identified multi-dimensionality of the concept. In this study, following the early multi-dimensional conceptualizations, the environmental attitudes conceptualized as a three dimensional concept; “environmental worldview,” “environmental concern” and “environmental commitment.” Test results confirmed this multi-dimensionality. Moreover, mentioned test results also identified that “environmental worldview.” The variation of the environmental values identifies that environmental worldview is basic and common form of environmentalism (3.921); environmental concern is moderate form of environmental values (3.890) and environmental commitment is most specific form of environmentalism (3.217).



Depending on sampling models the early research has been indicated that impacts of independent variables such as age, education, gender, occupation, income, residence and duration of residence are contradictory. Therefore, impacts of independent variables have been hypothesized that socio-demographic variables have no significant impact on basic and common form of environmental attitudes (worldview and concern) and the environmental commitment as more specific form of environmental attitudes (environmentalism) related to education. Test results supported to the hypothesized model that education and occupation have significant impact on environmental commitment: Highly educated respondents and highly prestigious occupants have more environmental commitment scores than that of lower educated and lower occupant counterparts.



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SUSTAINABLE BIODIVERSITY CONSERVATION IN THE NIGER DELTA: A PRACTICAL APPROACH TO CONSERVATION SITE SELECTION

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The rich biodiversity repository of the Niger Delta region of Nigeria is under severe threat from diverse sources such as deforestation, inadequate farming practices, invasive alien species, urbanization and oil and gas exploration and development activities. This biodiversity “hot spot”; is the second most sensitive environment in Africa. The over 70 Protected Areas (PAs) here have lost substantial portions of their area that translate to loss of biodiversity. The need to select representative sites within each of the ecological zones of the region for effective and sustainable biodiversity conservation is therefore inevitable. Vital site criteria that have ecological, socio-economic and cultural dimensions were selected and assessed through a combination of relevant scientific information, indigenous traditional knowledge and participatory rural appraisal (PRA) to yield Key Biodiversity Areas (KBAs). They are significantly different from the site selection criteria and principles used in the UK and to a large extent espouse the critical factors that underscore biodiversity conservation in a largely primary based economy such as in the third world. The 3 sites selected for biodiversity conservation through this process yielded not only community buy-in but also participatory action and ownership, which are critical for the sustainability of the biodiversity conservation efforts. Shell Nigeria and WWF representatives are already concluding plans to commence effective conservation project on the selected sites. This approach is hereby advocated for consideration and adoption for the preservation of the remaining stock of the unique biodiversity across the third world countries.

Introduction:

The Niger Delta region of Nigeria is very rich in Biodiversity. This assertion is evident from the works and documentations by various scholars and groups such as NDES (1997), Phil-Eze (2001), Were (2001), NDDC (2004), and FMENV (2004). This biodiversity repository is under severe threat from diverse sources such as deforestation, inadequate farming practices, invasive alien species, urbanization, oil and gas exploration and development activities (Phil-Eze and Umeuduji, 2004) as in other parts of the world according to Chapin et al. (2000). It is believed by scientists the world over (Whitmore, 1997) that the earth is in the midst of an unnatural mass extinction of biodiversity, and that resource exploitation by a rapidly expanding human population is a leading cause. The scenario is even much bizarre in the Niger Delta region of Nigeria where the growth rates of urbanization, human population and development is the fastest in Africa. It has been estimated that 10 species go extinct every year as part of natural processes and that if the current trend of extinction by unnatural processes continues, the extinction rate will reach 10,000 times more than the natural rate, claiming as victims 2 of every 3 terrestrial species by the end of the century (Meine, 1999, Finnamore et al. 2002). The Niger Delta region is regarded globally as a biodiversity “hot spot”; a World Wide Fund for Nature (WWF) Global 200 Ecoregion classified as critically endangered, and regarded by World Bank (1993) as the second most sensitive environment in Africa.



In spite of the many PAs in the Niger Delta region, no serious effort is on the ground by either tier of government or its agencies to enforce conservation of biodiversity. Consequently, many have lost substantial portions of their area and species of conservation value to farming, logging and development pressures that translates to loss of biodiversity. The efforts by non governmental organizations (NGOs) and corporate organizations such as Niger Delta Wetland Centre (NDWC) and Shell Petroleum Development Company (SPDC) of Nigeria Limited do not have the buy-in of the local communities and more importantly, inadequate to make visible impact for sustained conservation of biodiversity. There is therefore need for more hands to be on deck and to select representative sites within each ecological zones of the region for effective and sustainable biodiversity conservation in the Niger Delta through a process that takes cognizance of vital site criteria.

The Study Area:

The study area is the Niger Delta region of Nigeria where there are to date 70 Protected Areas (PAs) designated and gazetted as forest reserves, games reserves, national parks and strict nature reserves. They are grouped as shown in Table 1. Ninety percent of the PAs are forest reserves set up mainly for timber production while the remaining 10% were constituted for the sole purpose of protecting biodiversity. Furthermore, only a negligible fraction of the freshwater ecosystem of the Niger Delta is covered while no part of the marine ecosystem is under protection. This falls short of the international benchmark standard of at least 10% coverage of the entire regional area to be placed under protection of biodiversity.

S/No	Types of PA	Number	IUCN Category	States Found
1	Strict Nature Reserve	1	Ia	Edo
2	National Park	2	II	Cross River & Edo
3	Games Reserve	4	IV	Cross River & Edo
4	Forest Reserves	63	Unset	All States in Niger Delta
	Total	70		

Table 1: The Distribution of PAs in the Niger Delta Region of Nigeria

All the 70 PAs are contained in the WCMC database, (www.unep-wcmc.org).

The Niger Delta Region is considerably a wetland spanning over 11, 020km² (12% of Nigeria's surface area as shown in Fig. 1. With a population of 27 million in nine states of the Nigerian federation, it spreads across six ecological zones consisting of barrier islands, salt water marshes, mangroves, freshwater swamps, lowland rainforest, and derived savanna vegetation. It has the largest and most important mangrove forest in Africa, 3rd largest in the world and harbours a high diversity of flora and fauna – including endemic, endangered and threatened species. The region boasts of many species of conservation value categorized either as endemic, endangered, threatened, or rare and include some species on the IUCN red list. According to studies by Happold (1987), Powell (1997), Elgood et al (1994), among others, there are about 119 mammal species, 201 bird species, 248 fish species, 30 reptile species and over 850 vulnerable tree species in the Niger Delta region. With a total coastline of 400km, it accounts for about 50% of the Nigerian coastline and over 80% of the coastal fisheries production. In spite of the efforts of the scholars mentioned above, the Niger Delta remains till date grossly under explored for its biodiversity and bioresources. Its rich biodiversity supports considerable commercial activity and local livelihood.

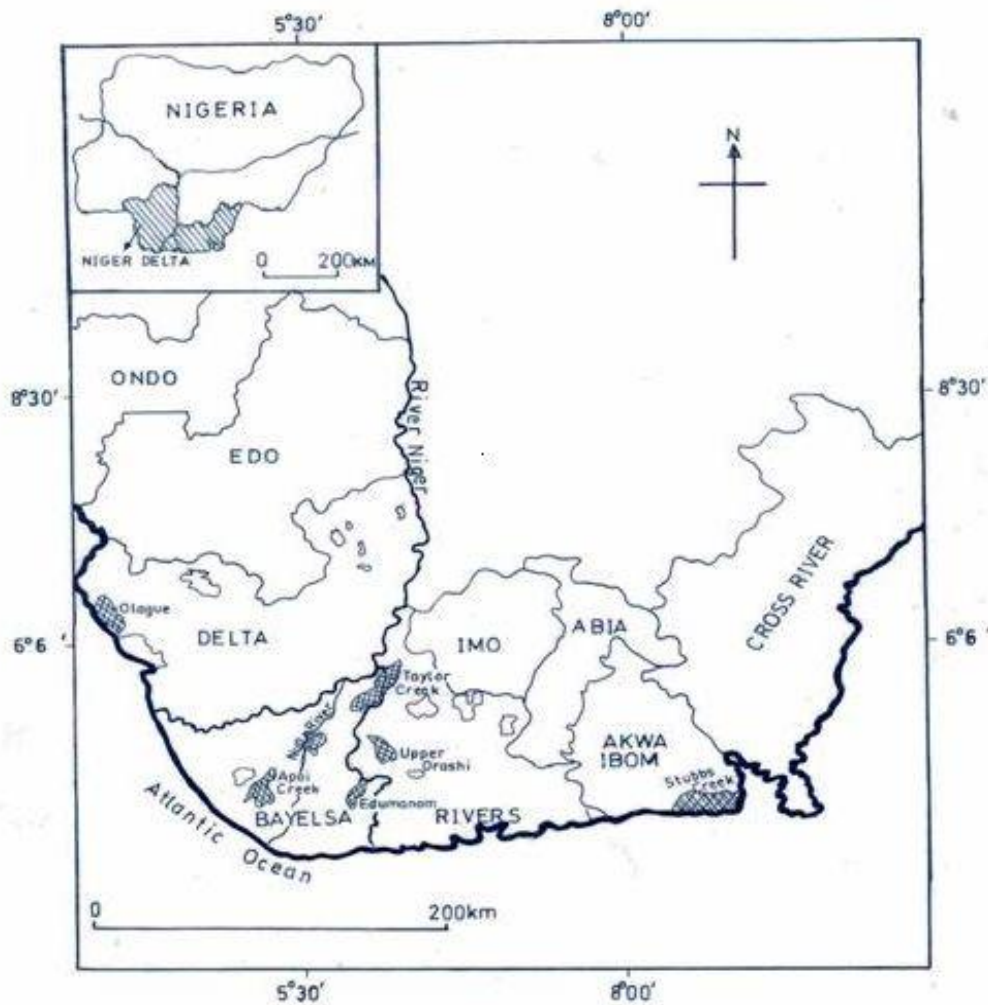


Fig. 1: Map showing the spatial distribution of the seven Protected Areas in the Niger Delta

Review of Cognate Literature:

Our review of cognate literature reveals a distressing lacuna in the criteria used for the selection of sites for biodiversity conservation in a largely primary based economy such as in the third world. Ezealor (2002) presented an account of critical sites for biodiversity conservation in Nigeria which turned out to be a mere tourist handbook. It made no effort to evaluate or advice on any approach to achieve sustainable conservation site selection in Nigeria. Others who have worked on biodiversity conservation or site prioritization in the Niger Delta include Ndukwu (2002), Obot (2003) and the Federal Ministry of Environment (2004). Their works are just tangential to the major thrust of this paper. Darwall and Vie (2005) attempted to extend the species-based approach to identifying important sites for conservation of freshwater fisheries by deploying in addition a seven step methodology that excluded the local people. The methodology did not put into consideration the local people's total dependence on the freshwater fishes for their daily livelihood.



Clearly, any conservation site selection exercise that excludes the local people from the use of the natural resources in sub-Saharan Africa is bound to fail. It can hardly meet Goal 1 and Goal 7 of the Millennium Development Goals of the UN, (UN, 2005). Of the site selection principles identified by the Australian and New Zealand Environment and Conservation Council (ANZECC) and the Representative Areas Program of the Great Barrier Reef World Heritage Area – universal value, representativeness, ecological integrity and protection against environmental change – it was not clear how the 4th principle would ensure the preservation of the first three against natural and more importantly, anthropologically induced forces. In the UK, the 7 site selection criteria in use are basically species specific with measurable thresholds that are predicated on size or extent, diversity, naturalness, rare or exceptional feature, fragility, typicalness, recorded history and cultural associations, connectivity within the landscape, value for appreciation of nature, and value for learning, (defra, 2006). The principles, criteria, processes and implications of their selection decisions are only justified and communicated to the local authorities, site owners, and the wider community rather than partnering with these groups of stakeholders from inception in the decision making process. In Latin America and the Caribbean, site selection is based on four criteria namely conservation value in the context of regional and national biodiversity priorities, complimentary to other important sites (in terms of types of biodiversity, threats, current protection status, and strategies), feasibility in terms of cost-effectiveness and opportunity and potential for leverage to other sites (PiP, 2006). In Mexico, ProNatura (2001) rightly remarked that although biological values of the sites play an important role, the interests of the landowners and other socio-economic considerations are equally relevant for sustainability with reference to the use of Private Land Mechanism for Biodiversity Conservation in Mexico, (PLBCM). This corroborates the earlier views of Sterling and Sitnik, (1997) when they pointed out that in the assessment of biodiversity sites, there is need to strengthen public involvement in shared decision-making with participatory strategies, to learn lessons from existing experiences, in order to draw valuable inputs for the success of the sites. The advisory board of PLBCM adopted a participatory approach to produce a set of fine tuned site selection criteria. When it was applied to 19 candidate sites, 5 sites emerged at the end as best suited for sustainable biodiversity conservation. Regrettably, this has not gained universal acceptance or application. This paper is of the view that unless the social license needed to ensure the sustainability of biodiversity conservation projects is obtained, the project is likely to die prematurely.

Materials and Methods:

Of the 70 PAs in the Niger Delta, seven were selected across the region (Fig.1) for this study using according to Eken et al (2004), standardized, globally applicable, threshold-based criteria of vulnerability and irreplaceability, driven by the distribution and population of species that require site-level conservation largely because of their biodiversity richness and conservation concern. The seven PAs are Apoi Creek forest (**Apc**), Edumanom forest (**Edf**), Taylor Creek forest (**Tcf**), Nun River forest (**Nrf**), Olague forest (**Olf**), Upper Orashi forest (**Uof**), and Stubbs Creek forest (**Scf**). The distribution and known status of these PAs are shown in Table 2.



	Protected Areas						
Protected Area Attributes	Apc	Edf	Tcf	Nrf	Olf	Uof	Scf
Mangrove ecosystem	Yes	No	No	No	Yes	No	Yes
Freshwater Swamp ecosystem	Yes	Yes	No	Yes	Yes	No	Yes
Lowland forest ecosystem	No	No	Yes	No	No	Yes	No
Locations by States	Bayelsa	Bayelsa	Bayelsa	Bayelsa	Delta	Rivers	Akwa-Ibom
Latitude (North)	04 39 46	04 39 10	05 15 34	04 57 13	05 41 30	04 54 12	04 34 56
Longitude (East)	05 54 26	06 23 54	06 30 43	06 10 59	05 08 45	06 31 06	08 09 25
IUCN Category	Unset	Unset	Unset	Unset	Unset	Unset	Unset
Area (Size)	64.77 km ²	86.76 km ²	218.91 km ²	97.15 km ²	184.68 km ²	89.90 km ²	31.08 km ²
Year of Designation	1975 & 1998	1975 & 1998	1975 & 1998	1975 & 1998	1991	1975	1930

Table 2: Available Information on the Seven Protected Areas in the Niger Delta

The ecological data of the PAs were collected from primary and secondary sources with input from fieldwork during which all PAs were visited. Local host communities of the PAs were interviewed to validate the presence/absence of species of high conservation values while historical accounts of the 7 sites were sourced from secondary data.

Site selection criteria were developed after a thorough scoping of all criteria identified from the literature reviewed based on the peculiar nature of the study area in consultation with the local communities. A set of criteria comprising mostly of desirable attributes of sites of conservation interest was developed for the purpose of evaluating the conservation status and values of the seven selected Protected Areas (PAs) in the Niger Delta. The attributes include aspects of ecosystem dynamics, plant and animal diversity, natural resource-based socio-economic activities, traditional institutions, and gender issues.

Participatory Rural Appraisals was conducted at these sites to gather inputs used to assess the social impacts of the sites to the local communities for the purpose of scoring and to develop entry strategy by the method of Interactive Community Forum (ICF), (Becker, Harris, McLaughlin and Nielsen, 2003).

The criteria were designed to select sites (based on a simple score system of 0 – 5) that has high biodiversity, high ecological value and there is a likelihood of success of a conservation intervention. The scoring was basically designed as shown below:

Positive	5	4	3	2	1	0
Category	Very high	High	Moderate	Low	Very Low	None
Negative	0	1	2	3	4	5



Each of the seven PAs was then scored for each criterion using the above score of 0-5. Depending on the disposition of each criterion, if it has positive impact on biodiversity conservation, a maximum score of five (5) indicating very high performance was given, while zero, the lowest point, signified poor performance of a site for an attribute. The reverse becomes the case where the criterion under assessment has negative impact on biodiversity conservation. For example, the presence of conflict over land in any site is regarded as a gross negative criterion and is scored zero. The high point of this method of assessment is that it relies essentially on scientific and indigenous knowledge of the sites ecological and socio-economic activities respectively to properly assign scores as the sites merit. A total of 32 criteria were used in the assessment out of which the first 16 were ecological attributes while the last 16 were of socio-economic nature as shown in Table 3 below. The sum of all scores of all attributes for each site was then used to rank the site.

Result and Discussion:

The sites scored interestingly and differently between the ecological and socio-economic attributes. Our analysis of the sum of scores between the two shows that ecological attributes of the sites have a slight edge (mean of 44.71) over the socio-economic attributes (mean of 43.14) for all the 7 sites under study. Thus, if the sites are to be ranked based on ecological criteria alone, Taylor Creek forest will emerge first (64) followed by Edumanom (47) and Upper Orashi forest (46), while Apoi Creek forest and Olague forest tied in the fourth position with a score of 44 each.

On the other hand, if we base our ranking on socio-economic factors alone, Taylor Creek still comes first (57), followed by Olague forest (49), then Edumanom (47) and Nun River forest (42).

However, when all the criteria were summed together as shown in Table 3, the ranking that emerged showed Taylor Creek forest maintaining its first position (121), followed by Edumanom (94), Olague (93), and so on as reflected in Tables 3 and 4.

Further analysis of the scores showed a high degree of positive relationship between ecological and socio-economic attributes of the sites. With a correlation coefficient of 0.828 which is significant at 0.05 percent level of confidence, it shows clearly that over 68% of ecological attributes of each site is determined by the nature of socio-economic activities within and around that site.

High degree of correlation is indicative of the heavy dependence of the local communities on ecological attributes of the sites typified by its biodiversity, particularly the species of high conservation value in the Niger Delta. It therefore shows the deep rooted relationship existing between the sites and the local people, a relationship which must be respected in order to achieve sustainable biodiversity conservation. Without this respect and involvement of the local people, the social license needed to ensure the sustainability of the conservation project will not be obtained. This is because; the sustainability of site ecosystem does not depend solely on their size or integrity, but also on the extent to which the local people impose social limitations.



Site Criteria	Perception	Sites score						
		Apc	Edf	Tcf	Nrf	Olf	Uof	Scf
Accessibility	+	1	4	5	2	2	3	5
Size (Area)	+	2	3	5	3	5	3	1
High biodiversity value	+	4	5	4	2	4	4	2
High environmental services	+	5	5	5	3	5	5	4
Presence of keystone species	+	0	2	3	1	0	2	0
Presence of endemic species	+	2	1	2	1	0	1	0
Presence of threatened species (IUCN red data categories)	+	5	5	5	3	4	4	3
Presence of other species of conservation concern	+	4	1	4	3	1	4	2
Established PA status	+	2	2	2	2	1	2	3
Fragility of landscape	—	3	2	4	3	2	3	1
Rate of loss of biodiversity	—	3	3	4	2	3	2	1
Level of Disturbance/intactness	—	4	4	3	3	4	3	2
Presence/Absence of exotics	—	1	2	5	2	3	3	2
Educational value	+	1	2	4	2	3	2	1
Research value (Environmental monitoring)	+	2	1	4	2	2	1	1
Complimentarity	+	5	5	5	4	5	4	2
Presence of NGOs	+	0	3	3	2	2	1	1
Presence of CBOs	+	0	2	3	2	2	1	1
Presence of established gender groups	+	2	2	4	2	2	2	2
Presence of resource (Economic) species	+	3	4	4	3	4	3	2
Importance to human communities.	+	2	2	4	2	3	2	2
Socio-economic importance of use	—	3	3	4	4	3	2	3
Rates of use	—	2	3	3	2	3	2	1
Presence of established RNR user groups	+	2	2	3	3	4	2	2
Existence of market network for NTFPs	—	2	3	3	2	3	2	3
Community attitude to CBRNRM	+	2	3	3	2	2	2	3
Presence of strong land tenure	—	2	3	4	3	3	2	2
Absence of conflict/Ambiguities	—	4	4	4	4	5	4	4
Are there access rights to bioresources	—	3	3	4	3	4	2	1
Are there other pressures (threats) affecting biodiversity?	—	4	3	3	2	3	2	1
Benefits of biodiversity conservation to local people	+	3	3	3	3	2	3	3
Presence of a strong and respected traditional authority	+	5	4	5	3	4	4	1
Total score		83	94	121	80	93	82	62

Table 3: Site selection criteria and scoring format



CBRNRM = Community Based Renewable Natural Resources Management

CBOs = Community Based Organizations

IUCN = World Conservation Union

NGOs = Non Governmental Organizations

NTFPs = Non Timber Forest Products

RNR = Renewable Natural Resources

PA = Protected areas.

S/No	Name of Protected Area	State	Total Score	Rank
1	Taylor Creek Forest	Bayelsa	121	1st
2	Edumanom Forest	Bayelsa	94	2nd
3	Olague Forest	Delta	93	3rd
4	Apoi Creek Forest	Bayelsa	83	4th
5	Upper Orashi Forest	Rivers	82	5th
6	Nun River Forest	Bayelsa	80	6th
7	Stubbs Creek Forest	Akwa Ibom	62	7th

Table 4: Rank Order of the Protected Areas

The result of the study has equally shown that in the third world countries generally and in the Niger Delta region of Nigeria particularly where the local people have engaged the multinational corporations, development agencies and governments in a running battle over the years because of environmental degradation, a marriage of biodiversity conservation site selection criteria between the ecological and socio-economic attributes appears seemingly plausible to attract community buy-in and active participation in conservation. The application of purely mathematically based models such as the dynamic reserve site selection advocated by Costello and Polasky (2001) cannot work in the Niger Delta. This is because such models are predicated upon biodiversity values and to some extent development threats to the neglect of the people's dependence on bioresources and socio-economic activities. In the Niger Delta region of Nigeria, it is survival below the poverty line for the 70% of the rural population that threatens biodiversity and not development pressures per se. That is why any attempt to capture the real issues for sustainable biodiversity conservation must begin with an assessment of the people's socio-economic activities through PRA.

The World Bank (1994) applied PRA to determine which technique suited the project of natural resource management in Burkina Faso. The result was a successful project based on a multi-tiered process in which communities design management plans, exercise ownership and control of the resources with the help of multidisciplinary teams of natural and social scientists. PRA are essential ingredient in a process of carrying all levels of stakeholders, identifying actual resource use patterns and ensuring sustainability of project concept and design. Our application of a variant of PRA, (i.e. ICF) enabled us to explore and plug all possible loopholes in order to achieve our target.



Based on the outcome of our ranking exercise, we selected Taylor Creek, Edumanom and Olague Forest Reserves to be first, second and third sites respectively for a sustainable biodiversity conservation project in the Niger Delta region of Nigeria. Among the three sites, Taylor Creek is located in a lowland forest ecosystem, Edumanom forest is located in a freshwater swamp ecosystem while Olague forest is located in a mangrove and freshwater swamp ecosystem.

Conclusion:

In conclusion, this methodology has been developed with technical input from other biodiversity experts in Nigeria who are experienced in site prioritisation, and environmental impact assessors from SPDC. It is highly compatible with existing environmental disposition of the Niger Delta region and makes good use of the complementary work of stakeholders as partners.

The application of these 32 ecological and socio-economic criteria in the selection of three best scored biodiversity conservation sites in parts of Nigeria's Niger Delta region has yielded not only community buy-in but also participatory action and ownership, which are critical for the sustainability of the biodiversity conservation efforts. This approach is hereby advocated for consideration and adoption for the preservation of the remaining stock of the unique biodiversity across the third world countries where dependence on natural resources by the rural population remains the only hope of survival.

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RELIGIOUS AND SECULARIST VIEWS OF THE ENVIRONMENT: GOD, HUMANITY AND NATURE IN SOCIOLOGICAL PERSPECTIVE

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As we know, the 20th century, especially the last decade of that century is characterized by the globalization. But, with global environmental problems taking center stage, we are often unconscious of the seriousness of our environmental problems. The aim of this paper is to summarize the intense debate about the nature, especially the religious and secularist views of the nature in sociological perspective.

In pre-modern age, it was considered that the world was charged with the grandeur of God. In religious view, all creatures were given their purpose by their creator. But, in the modernization process, human beings witnessed the disenchantment of the world; the significance of 'religion' as a socio-cultural category demised. As religion/god receded from co-extensiveness with nature, secular values of environment developed. The one of meanings of secularization is that of desacralisation of the world. The world loses its sacred character as man and nature become the object of rational-causal explanation and manipulation in which the supernatural plays no part. Secularization may also mean simply movement from a 'sacred' to a 'secular'. Central to Durkheim's own definition was a distinction between the sacred and the profane.

On the other hand, this paper will study some questions. For examples, "What is nature?", "Who is god?", "What is the relationship between god and nature?", "Is religion compatible with environmentalism, and to what extent?", "What stances do the different religions take?", "Is a coalition organized around core values possible?". In this context, the essential question is to understand how nature worked. Could the answers all to be found within nature itself or must we refer to supernatural forces, e.g. god? By way of entry into the debate about modernity and secularity, I will focus on a sociological answer to these questions about the nature.

Keywords: *Religion, environment, environmentalism, nature, god, secularization*



Introduction

I have been asked to talk about what I consider the most important problems facing the world; one of them is peace, another is environmental problems. As we know, the problem of the environment is one of today's most serious problems. It is a problem that threatens not only ourselves, but the whole world, and future generations and their right to live in a healthy environment.

In fact, we have faced with the widespread destruction of the environment. As we know, the current worldwide ecological crisis has emerged during the past four decades. In this period, the public in general as well as political leaders are concerned about this problem, and experts from a wide range of disciplines are studying its causes. People everywhere are coming to understand that they cannot continue to use the goods of the earth as we have in the past. So, a new ecological awareness is beginning to emerge. Some of people propose economic and technological precautions for that crisis. But the problem is not simply economic and technological; it is moral and spiritual (see Bayraktar 1992:143-4).

In pre-modern age, it was considered that the world was charged with the grandeur of God. In religious view, all creatures were given their purpose by their creator. But, in the modernization process, human beings witnessed the disenchantment of the world; the significance of 'religion' as a socio-cultural category demised. As religion/god receded from co-extensiveness with nature, secular values of environment developed. In this paper I will try to summarize the intense debate about the nature, especially the religious and secularist views of the nature in sociological perspective.

Two years ago, a professor, an engineer of forest, said at his conference that the trees have a mechanism; its system takes the water from the soil and gives it to sky. It is not a coincidental event. There is a maker or master.

This case affected on my ideas. So I decided to write this paper. In this paper, I will summarize religious and secular views of the environment. This paper is consisting three parts.

1. Religious views (Pre-modern period)
2. Secularist views (Modern period)
3. Recent views (Post-modern period)

If we return our example that the trees have a mechanism, its system take water from the soil and give it to air. In this case, I think the word of master means God. But this professor didn't say that he is God. On the contrary, he said that "It is not a coincidental event." He never said that all things in nature was been created by themselves. He didn't believe that creation of universe was spontaneously. This professor was neither a religious nor a vulgar materialist and atheist. He was a secular scientist, because he had been taken secular education.



In religious period, agent or actor is god. In secularist period, it has a mechanism. In recent postmodern period, it is not a coincidental event, there is a maker or master, but he may be God or not.

1. Religious views

In pre-modern age religion was a dominant factor on every area of life. For example, every significant event in the life cycle of the individual and the community was celebrated with various rituals and given a religious gloss. Birth, marriage, and death, and the passage of the agricultural seasons, because they were managed by the religious leaders, all reaffirmed the essentially religious world view of the people. In other words, a huge amount of credibility was given to the religious world view simply through everyday social interaction. For example, as Bruce, who is one of powerful authorities on secularization debates, said; “People commented on the weather by saying ‘God be praised’ and on parting wished each other ‘God Speed’ or ‘Goodbye’ (which we often forget is an abbreviation for ‘God be with you’).” (Bruce 1999:20).

In religious view, it was considered that the world was charged with the grandeur of God, and all creatures were given their purpose by their creator. But in religious view also humans have more special position than all creatures and nature. For example, Judaism, Christianity, and Islam, the three great faiths are noted for separating humans from the surrounding ecosystems. According to these faiths, it is considered humans separate and special, created in the image of God. In one interpretation, humans are here partially to provide wise stewardship of nature; at the other extreme nature is placed here for the pleasure of humans, to be used and discarded as needed. In other words, great religions are tolerant for the idea that God’s command that humans have dominion over all created things has too often been used as an excuse to plunder the earth.

Now, to understand some details in religious views, we should examine religions, because their origins are in the texts of religions.

1.1. Great Faiths

In this title, Judaism, Christianity, and Islam, the three great faiths for which Abraham is an originary figure, will be examined.

1.1.1. Judaism

The religions of Egypt and Mesopotamia were profoundly cosmological. The human world was embedded in a cosmic order that embraced the entire universe, without any sharp distinction between the human and the non-human, the empirical and the supra-empirical. Such continuity between people and the Gods was sharply broken by Judaism. As Berger puts it:

“The Old Testament posits a God who stands outside the cosmos, which is his creation but which he confronts and does not permeate.” (Berger 1969:115).

The God of Ancient Israel was a radically transcendent God. There was a thoroughly demythologized universe between humankind and God. (Bruce 1999:13).

But ask the beasts, and they will teach you; the birds of the sky, and they will tell you; or speak to the earth and it will teach you; the fish of the sea, they will inform you. Who among all these does not know that the hand of the Eternal has done this? (Job 12:7-9).



1.1.2. Christianity

In his essay, “Historical Roots of our Ecological Crisis” that has received widespread attention over the years from scientists as well as humanists, Lynn White correctly identifies the dominant strain or core structure of Western theism that represents God as transcending the world and humanity as exercising dominion over the natural order. White claims that “Christianity is the most anthropocentric religion the world has seen”, that it “not only established a dualism of man and nature but also insisted that it is God’s will that man exploit nature”. The most important source cited to support this is Genesis 1:28, which calls on man to “Be fruitful, multiply, fill the earth, and subdue it. Have dominion over the fish of the sea, over the birds of the sky, and over every living thing that moves on the earth”. (Genesis 1:28). In this essay, Lynn White links Christianity to environmental degradation. He does qualify his argument, stating that “Christianity is a complex faith, and its consequences differ in differing contexts.” He criticizes the Western European version of Christianity from the Renaissance onward, with its rationalistic view of science and technology, in combination with the Bible. Decoupled from nature by the Bible, given the power of scientific domination, humanity has, in White’s analysis, unleashed an increasing devastation upon the earth.

According to White, the Western world’s attitudes towards nature were shaped by the Judeo-Christian tradition (he also included Marxism within this overall tradition). This tradition involved the concept of a world created solely for the benefit of man. Along with this, Western Christianity separated humans from nature. In older religious traditions, humans were seen as part of nature, rather than the ruler of nature. And in animistic religions, there was believed to be a spirit in every tree, mountain or spring, and all had to be respected.

White’s influential article asserted that Christianity was to blame for the emerging ecological crisis through using the concept of the “image of God” as a pretext for justifying human exploitation of the world’s resources. But, in *Reenchantment of Nature: The Denial of Religion and the Ecological Crisis*, Alister E. McGrath rejected Lynn White’s views on nature. According to McGrath, “these were bold and simple words, written at a formative stage in the emergence of the modern environmental movement... A scapegoat had to be found for the ecological crisis, and this article conveniently provided one. Where there is a problem, there is a perpetrator... Christianity is the enemy of the environment.” (McGrath 2003:xv-xvi).

1.1.3. Islam

The Koran and the Hadith, Islam’s primary and secondary authorities, gives specific rules about various environmental practices. It is possible to say that the Koran is replete with references to the precious resources of air, water, and land, and proscribes wastefulness. The Koran also calls for thinking about the nature and its sustainability:

“Behold! In the creation of the heavens and the earth; in the alternation of the night and the day; in the sailing of the ships through the ocean for the profit of mankind; in the water which God sends down from the sky, thereby reviving the earth after its death; in the beasts of all kinds that He scatters through the earth; in the change of the winds, and the clouds subjugated between the sky and earth [here] indeed are signs for a people who thinks.” (Koran 2:164).

The Prophet Mohammed is said to have encouraged the planting of trees, banned destroying vegetation even during war, loved animals and displayed great kindness to them, and encouraged other Muslims to do likewise. For example, He said, “On doomsday, if anyone has a palm shoot in his hand he should plant it.”



The earth is mentioned some 453 times in the Koran. Islam does understand the earth to be subservient to humankind but it should not be administered and exploited irresponsibly. There is a strong sense of the goodness and purity of the earth. The Prophet Muhammad said that the earth has been created for me as a mosque and as a means of purification. So there is a sacrality to the earth which is a fit place for human's service of God.

Like the Holy Bible, humankind has a special place in God's scheme in Koran, the holy book of Islam. According to the Koran the creation of the cosmos is a greater reality than the creation of humankind (Koran 40:57), but human beings have been privileged to occupy a position even higher than the angels as vicegerents of God on the earth. The conception of Khalifa –or the role of stewardship-has important in Islam. Humankind is guardians of earth. Khalifa is the sacred duty God has ascribed to the human race. Because the human is the most favoured of God's creation, everything in existence was created by Allah for the use of humans. The idea of human vicegerency on earth has drawn much criticism in environmental ethics. But, with respect to humankind's stewardship of the earth, the privilege entails a profound responsibility. There are many verses in the Koran that describe human duties and responsibilities, such as the following which aptly summarizes humanity's role: "It is He who has appointed you viceroys in the earth." (Koran 6:165). The concept of stewardship doesn't mean that creation is the possession of humanity.

In Islamic perspective, humans are God's vicegerents on the earth; it has been given us in trust (emanet) (Koran 33:72). But they are not the lords of nature and the world, so the world is not their property which they can dispose of as they wish or as they are able. Nature was created by God and it belongs to God. Everything in nature is a 'ayet' (sign) of God's existence. The creation itself, in all its myriad diversity and complexity, may be thought of as a vast universe of 'signs' of God's power, wisdom, beneficence, and majesty. The whole creation praises God by its very being (Koran 59:24; compare with 64:1). (Denny 1998). Our duty, therefore, as God's vicegerents and trustees, is to show respect for the trust, and to preserve it carefully, in no way wasting its natural resources when using or consuming them. For vicegerent (khalifa) means 'deputy'. And this in turn means that man is the sole being whom God holds responsible for the earth, to whom He has entrusted its preservation. Such a deputy would not betray the trust of the One who created the world with a particular order, balance, and harmony. If he was to spoil the order and harmony and destroy them, he would be known as an unreliable and perfidious deputy.

It is clear that the Islamic world view could not endorse any view of man's vicegerency of the earth which destroys and spoils the ecological balances and the order and systems of nature. The ecological balance and its sustainability have important in Islam. (see Hicr 19; Rahman 7-9; Kamer 49).

According to Seyyed Hossein Nasr, one of the Muslim thinkers regarding environmentalism, it is possible that ecological crisis brings up from that the people didn't break off relation to Allah which embraces them and supports their lives. The devastation of natural environment means that the nature is seen ontologically independent from god or divine environment. (Nasr 2006). To Nasr, traditional Islam supports a harmonious balance between human and nature, while both modern and fundamentalist versions distort Koranic verses, allowing technology to run amok.



Islam considers the creation of the universe an open book, a guide inviting observation which increases the faith of the observer. In some verses of the Koran all creatures including plants and animals, sun and stars named 'ayet' (sign of Allah) and they are witnesses of Allah. Therefore this fact points out that there is a powerful emphasize to nature in the Koran.

If one studies the histories of the Muslim peoples, one sees that they lived in harmony with nature and its creatures. The most reliable witnesses to this were Western travelers who visited the Muslim lands. For example, the French lawyer Guer, who traveled in the Ottoman Empire in the 17th century, mentioned a hospital in Damascus where sick cats and dogs were treated. Again, the famous French writer Montaigne touched on this subject when he said: "The Muslim Turks found hospitals and pious foundations for animals even." Because The Muslim Turks found pious foundations for various purposes, such as solidarity and help each other, they are pioneers in the history of pious foundations. The Muslim Turks found these foundations for building mosques, helping for poor, ill, widowed, orphan either motherless and fatherless, accommodation of students, preparing trousseau for orphan girls, watering and protection the trees, filling up animals to go hungry in winter. (Kirman 2004:244).

Prophet Mohammad says that any Muslim who plants or cultivates vegetation and eats from it, or another person, animal or bird, eats from it will receive a reward for it from Allah. He also said that anyone who plants a tree under which people seek shade or shelter from the sun will have his reward with Allah. (Musnad, V:415). Therefore the cutting down of trees without strong and legitimate reasons is encroaching on the bounties of Allah, and on the beauty of the environment which Allah has created.

We must deal with animals with utmost beneficence and compassion. It is forbidden in Islam to kill an animal for mere play or sport. The Prophet said that he who is kind and merciful towards animals, Allah will be kind and merciful towards him.

1.2. Other Faiths

In this title, the various Eastern faiths like Hinduism, Buddhism, Confucianism, Taoism and Shintoism will be examined.

It is possible to consider these faiths to provide a strong model of human harmony with nature. But there are some strong ideas of pantheist philosophy in the doctrines of these faiths. All things are the works of the Great Spirit. He is within all things: the trees, the grasses, the rivers, the mountains, and the animals, and the winged people. In this context we keep in mind these faiths are not religions, but philosophical systems. Because they are philosophical systems, their doctrines can easily be reinterpreted in an ecological fashion or in other ones. For example although the picture of the Buddha seated under the tree of enlightenment has not traditionally been interpreted as a paradigm for ecological thinking, today's Buddhist environmental activists, sometimes characterized as ecoBuddhists or Green Buddhists.



The concepts of karma, samsara, and nirvana are important doctrines in Buddhist tradition. By karmic continuum, Traditional Buddhism may privilege humans over animals, animals over hungry ghosts, male gender over the female, monk over laity. But contemporary Buddhist environmentalists claim that although karmic continuum constitutes a moral hierarchy, differences among life-forms and individuals are relative, not absolute. Buddhist environmentalists see their worldview as a rejection of hierarchical dominance of one human over another or humans over nature, and as the basis of an ethic of empathetic compassion that respects biodiversity (Swearer 1998). Among contemporary Buddhists, there has been the most insistent on the central role of mindful awareness in the development of a peaceful and sustainable world.

2. Secularist views

The ecological crisis is a crisis of modernity. The ecological crisis, wrought by exploitative attitudes toward nonhuman life and by the careless despoliation God's world, is surely a manifestation of the broader problems of modernity. (Carter 2001:359).

In modernization period, it raised a growing trend to accept the authority of experimental or scientific observations rather than religious sources of authority. In this view, nature was to be examined and explained on its own terms. Human have become tend to commitment to a "let's dominate and transform nature" mentality. The roots of the same idea could be found in some of the pre-Socratics, the earliest Greek philosophers. They argued endlessly about how it was possible to know the true nature of the world. According to them the universe was rationally constructed and it could therefore be understood through the right use of human reason and critical reflection. (McGrath 2003:182).

During the Enlightenment it was Secular Humanism that turned the god into a spiritual entity. This understanding perhaps reached its zenith in the West in the decades immediately following World War II. Many have laid the blame for this firmly at the feet of an uncritical scientific positivism, which saw intellectual mastery of nature as the prelude to its economic exploitation. (McGrath 2003:100).

We know the story of the formation of the modern world, the dominant intellectual framework and its beginnings in the 17th century, known "Enlightenment Age" with the publication of Descartes' Cartesian philosophy propounded a dualism that separated mind and matter and then its development in the 18th century with Newtonian physics. This mechanistic view of the world encouraged the development of science and technological invention on purely mechanistic lines, and also industrial plundering. (Berry 1996). As new technologies were developed, our powers of dominion over our world increased exponentially.

In the modernization process, human beings witnessed the disenchantment of the world; the significance of 'religion' as a socio-cultural category demised. As religion/god receded from co-extensiveness with nature, secular values of environment developed. The one of meanings of secularization is that of desacralisation of the world. The world loses its sacred character as man and nature become the object of rational-causal explanation and manipulation in which the supernatural plays no part.



It is important to note that secularization has been defined in several ways (see Kirman 2005:51-4). Secularization is, in Max Weber's term, "disenchantment of world". One definition "identifies secularization as de-institutionalization. This refers to a decline in the social power of once-dominant religious institutions whereby other social institutions, especially political and educational institutions, have escaped from prior religious domination." (Stark 1999:250-1). In referring to Durkheim's definition which was a distinction between the sacred and the profane, secularization may mean simply movement from a 'sacred' to a 'secular' society. In the sense of an abandonment of any commitment to traditional values and practices, the acceptance of change and the founding of all decisions and actions on a rational and utilitarian basis, "this usage is far wider than any which refer only to an altered position of religion in society." (Hamilton 2001:187).

In pre-modern age, it was considered that the world was charged with the grandeur of God. In religious view, all creatures were given their purpose by their creator. But, modern secular culture has chosen to break with its religious roots and declare that human liberation and fulfillment come about through the domination of the natural world. In this view, nature has nothing to do with the divine. It was not divine, and was not given any special status or privileges in the face of human inquiry and advance. An older view of nature, which held that it possessed a position of privilege and dignity and held humans accountable for how they used it, was swept aside. Secularization eliminated both any special divine status of nature and any human responsibility toward it (McGrath 2003:110). In modernization process, because humanity has become the measure of all things, human attitudes to nature are defined on utilitarian and exploiter grounds.

It was Sigmund Freud who referred to religion as "the future of an illusion". Friedrich Nietzsche (1844-1900), known a popular representative of modern version of atheism, said "God is dead". This slogan has become a title of a book, *God is Dead* by Steve Bruce. The existence of God was seen as the last bastion of many traditional beliefs. Eliminate God, and the last remaining obstacle to an unfettered human autonomy would have been removed. People could do what they liked. Remove God, and all things become possible. As Dostoyevsky put it in *The Brothers Karamazov*, "If God is dead, then all things are permitted." (McGrath 2003:61).

While looking at the world in secular, in views of those pursuing religious goals, rational terms made life difficult and reduced all value to the material factors. Although we take to stand for the secular mindset, we can focus on nature, and recognize environmental problems. Modern man has an "anthropocentric" conception that human is at the center of all things, and is the origin of all values. But in the beginning of 21st century this conception has come to change, because "eco-centric" has arisen. (Özdemir 1998:68).



3. Recent views

In two or three decades, we hear much talk of “ecology”, “ecological crisis”, “environmentalism”, “environmental pollution”, “nourishment by natural foods”, and “relationship between environment and religion”. Because, by benefit-cost analysis, people want to try maximization their benefit or interests and to gain more consumer goods and a larger income in these days of globalization. So, the problems broke out over the root cause of environmental degradation, with some finding it in population growth, others in technology, science and technology, the misuse of science and technology, capitalism, or the consumer society. Many of environmental problems can be traced to products people consume. For example, with only 5% of the world’s people, North America consumes 25% of the world’s resources.

In the 1980’s environmentalism has become popular, because the most environmental documents, web sites are available. And also environmental sociology has raised. But the environmental movement also predated the institutionalization of environmental sociology (Buttel 1987:475), which involves recognition of the fact that physical environments can influence (and in turn be influenced by) human societies and behavior. (Dunlap and Catton 1979:244).

In this point, religion is insufficient properly to satisfy their material needs, because its nature has most rules. But environmentalism offered new ways for these needs in terms familiar to the secular culture. Moreover it can be said that environmentalism has become faith, especially a secular faith in postmodern period. Because its call for us to live in a new way, in a new order. Like new social or religious movements.

As Michael Crichton said;

“Today, one of the most powerful religions in the Western World is environmentalism. Environmentalism seems to be the religion of choice for urban atheists. Why do I say it’s a religion? Well, just look at the beliefs. If you look carefully, you see that environmentalism is in fact a perfect 21st century remapping of traditional Judeo-Christian beliefs and myths.

There’s an initial Eden, a paradise, a state of grace and unity with nature, there’s a fall from grace into a state of pollution as a result of eating from the tree of knowledge, and as a result of our actions there is a judgment day coming for us all. We are all energy sinners, doomed to die, unless we seek salvation, which is now called sustainability. Sustainability is salvation in the church of the environment. Just as organic food is its communion, that pesticide-free wafer that the right people with the right beliefs, imbibe.

Am I exaggerating to make a point? I am afraid not. Because we know a lot more about the world than we did forty or fifty years ago.” (Crichton 2003).



Environmentalism has called on religion to support a very secular and political cause, here an apparently political cause looks toward higher ends. It has these characteristics because it grounds its actions not in a view of society but in an answer to more fundamental questions about what nature is, what humans are and what place they have in the world, in short, in an answer to the classical questions of religion, and so any adequate view of environmentalism must recognize it as a religious movement. But the environmentalism looks to scientific ideas rather than a revelation from on high. In this context, by religion, I do not mean creeds or denominations, because religion, as Durkheim said, had been (thing which is) “to be believed”, rather than “to be done” in modernization/ secularization process.

Environmentalism used some ideas, e.g. to heal nature or our alienation from nature and to restore harmony between humans and the land, to point toward a new life style, even a new society. Thus it appeals much people who could not accept any religious tradition or beliefs, by offered similar conventional religious heaven. Because it addressed human needs secular culture neglected, environmentalism emerged as a serious challenge to the conventional religious traditions and to Enlightenment ideas developed in the seventeenth century.

The religion's reverence for nature was appealing to those concerned with ecological issues. For a generation that questioned authority, the religion offered a spiritual path that was nonauthoritarian and encouraged self-development through ritual and magical practices. (Berger 1998:219).

It can be asked this question, here: “Can environmentalism take the place of religion?” A lot of people say that atheists don't believe in anything. While that's true for some, it doesn't have to be true for all atheists. After all, there's a lot more to life than worship. What's an atheist to do? He is at crossroad: To temple or not to temple. In West, some atheists choose to go to church even though they don't believe. A great alternative for atheists is to join non-religious activist groups. (Environmentalism used a new perspective. Now it offers political activism both with limited appeal.) Activism is like religion in that it is based in groups of people that come together because of shared ideals, but it's unlike religion in that it doesn't demand absolute allegiance or an abandonment of critical thinking (at least in the best activist groups – As we know there are some activist communities in which unthinking devotion is a basic requirement of membership).

Environmentalists have hardly examined the religious and philosophical traditions, Western as well as Eastern, that offered ways to think about these environmental problems. Environmentalists may find it difficult to adopt a religious perspective, even as a tool for analysis, for they, as much as their opponents, hold to the modern secular view.

In postmodern period, because Enlightenment rationalism has partly outdated and outmoded, it has been claimed that legacy of Enlightenment can be ignored, and that nature reenchant. To reenchant nature is to accept and cherish its divine origins and signification. (McGrath 2003:185).



Conclusion

Ecological crisis or environmental problems is the most important challenge facing mankind. In the globalization age, it takes on a special urgency and importance. I believe it can and should be improved.

Firstly, it is necessary that all people save themselves from the insanity of consumption, especially in technological area. In 20th century the capitalistic product relationship has made the environmental destruction. The natural world surrounds us. As we know, the natural world is not so malleable. On the contrary, it will demand that we adapt to it, and if we don't, we die. It is a harsh, powerful, and unforgiving world. So, we must use science and technology in a full and constructive way.

The world belongs to all of us. Everyone has a part to play, but for the demands of justice, charity, and solidarity and environmental sustainability. We are all obliged to conserve and protect these values. We must co-operate and work together for a better world, a better future, and a better environment. We must love and preserve our environment and all the living creatures within it. As Yunus Emre, the Turkish poet of 13th century, said: "We love creatures for the sake of their Creator"! In this way, the 21st century will be the century of peace, happiness, tolerance, and brotherhood. Not only for human, but for all creatures either animate or inanimate.

Secondly, we need norms or an earth ethics which arrange relationship between human and nature. But the history of Environmental Law is new. However, both secular and religious expressions may play a constructive role in ongoing deliberations on religion and ecology. The issues at the heart of our ecological crisis, which we must grapple with it, do not fall within the domain of a single discipline. So, both religious and secular perspectives certainly can and should play a role in the common cause of restoring ecological balance. Religion and secularism have fundamentally different views of humans, the nature and the world, but environmentalism is much different from religion and secularism. It is included from parts of them. It seems as a version of the modern secular religion of science and reason. It seems as a religion without God. Environmentalists used some elements of religion without understanding them.

Religions and belief systems have been considered as important conduits in shaping social attitudes toward nature and the environment. What role does religion play in shaping our attitude towards the natural world? It is possible, then, that religions could present a leading voice in environmental thinking. Jews, Christians, Muslims, Hindus, Buddhists, Confucians and the followers of other religions must collaborate with secular humanists or atheists to save the nature and all creatures of God, because they have also some motives about nature. According to a study which is performed in Britain, there is no significant difference among adherents of different religions concerning environmental attitudes. (Hayes and Marangudakis 2001). We have much to learn from religious and cultural traditions that locate the human within nature. We think there are origins of environmental ethics in religious texts.



All religions contain concepts that can lead to the enhancement of core human-earth relations and earth ethics. All religious traditions can guide and stimulate us about the nature. And as we know, respect for nature is of course central in many other religious rituals. For example, the believers pray to God for the wholesomeness of the water and air, for the orderliness of the seasons, for the abundance of the fruits of the earth, and for the usefulness of the animals. It is also possible to say that all religions or religious texts have enormous potential for renewed appreciation of nature and environmental sustainability.

The some implications about how it was possible to achieve the environmental sustainability and better world, could be found in some of the writings of either the Old Testament or Koran, especially those focusing on the theme of wisdom. According to McGrath, the wisdom writings of these sacred texts insisted that sense could be made of every aspect of life—from the movements of the stars to the behavior of people. It was all a question of combining close observation of the world with the right explanatory framework. Observing the world opens the door to an understanding of the greater matters of life. (McGrath 2003:182).

The basic theme of this paper is simple. It suggests that we try to reconnect to nature. We must learn to see the meaning, value, and beauty of nature. We dwell in this world. The natural order is our place of living. Let us appreciate the wonders of nature. We must keep the creation just as God keeps us.

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RELIGIONS AND ENVIRONMENT: THE PRACTICE OF MORAL APPROACH TO NATURE IN TURKISH CULTURAL HISTORY

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As it is known, one of the most problematic areas resulting from the economic globalization process is the destruction of natural environment and its ecological impact on nature. So the question of sustainability of environment is scholarly concerns of ecologists, environmentalists and scholars.

Having given briefly the views of some religions about the natural world, I will look at the “nature” from the Turkish cultural outlook. According to the knowledge sociology, individuals are still influenced from religion. Because religions affect the culture of the society in which individuals are brought up.

In the second section of this paper I will concentrate on the cultural values related to the natural world from the sociological perspective. Having analyzed this, I want to explain how this outlook which will contribute a clearer environment and protections of the nature will be popularized and internalized.

Introduction

There is an interactive relationship between living things and their environment. The scientific study of such phenomena falls within the province of sociology of environment. The scientific study of society and environment is an attempt to outline the interactive relationship between man and nature. This area of study selecting one aspect of social interaction which is primarily environmental in nature has an inter-disciplinary structure which includes as science and technology, economy, cultural attitudes, the power relations and social institutions. While approaching to the problem from the framework of relationship between technology, production and consumption we have to pay attention to the social forces which are extremely complex and variable.¹

The words like ecology, environment, pollution, green are heard about the earth and its resources became popularized in the 1980s due to a growing concern with the fragility of the earth as a living system. A variety of indicators are acknowledged to be warnings that natural systems evolved over millennia are being threatened by the technological developments initiated by the industrial revolution and the resultant population explosion. Such indices include the extinction of many species of plants and animals, changes in wheater patterns and pollution of large areas of land and water upsetting the natural balance of many smaller systems. At the same time we are becoming more aware of how much everything is linked together and how human deeds can affect other creatures.

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¹ See G. Szell, Technology, Production, Consumption and the Environment, ISSJ, 140, 1994, pp. 213-225.



Despite new environmental regulations, the increasing availability of ecofriendly products and many other encouraging developments championed by the environmental movements, the massive loss of forests and the greatest extinction of species in millions of years has not been reversed. By depleting our natural resources and reducing the planet's biodiversity we damage the very fabric of life on which our well-being depends.

More stringent environmental regulations, better business practices and more efficient technologies are all necessary, but are not enough. The contribution of ethical principles at solution of serious problems such as poverty, social corruption and environmental pollution is not forgotten. For this reason the strengthening of feelings like ethical behavior and social responsibility are increasingly becoming very important.²

From the functional perspective, society requires a certain degree of social solidarity, value consensus, harmony and integration between its parts. The function of religion is the contribution it makes to meeting such functional prerequisites, for example, its contribution to social solidarity and reinforcing social values.³

Thus, as scientists, we are not concerned with whether any particular thing or practice is good or bad. We are, however, concerned with whether particular people define particular things or practice as good or bad. It should be clear then that our interest is in these definitions not in any inherent quality of anything to which these definitions are applied.⁴

In the famous functionalist Talcott Parson's view, a moral commitment is essential to motivate people to obey the rules. Thus, rules governing business transactions must ultimately drive from shared values which state what is just, right and proper.

As it is known in small scale, non literate societies that is in the sacred type society, religion plays a very important role and it permeates the whole social structure. But through the evolution of society the newly emerged secular-type society involves a process of structural differentiation; various parts of the social system became more specialized and so perform fewer functions. Parsons argues that religious beliefs still give meaning and significant to life. As religious institutions become increasingly specialized, Parsons maintains that their ethics and values become increasingly generalized.⁵

According to this perspective, religion is one of the sources of moral definitions. Certain types of behavior are believed to receive supernaturel approval, while others are disapproved. Religion, then, includes a various of definitions as to what humans should do when they interact, for example, with nature. This understanding is seen in the works of Adam Smith who is considered to be founder of modern economy. Although he is widely associated with advocacy of the doctrine of laissez-faire, Smith was not blind to the adverse implications of the division of labor, noting its potentially stultifying and dehumanizing effect on workers. So, having written the vealth of Nations, he has written The Theory of Moral Sentiments.

² T.Akyol, Poverty Socialism, Liberalism, Radikal, 05 August 2006.

³ M. Haralambos-M. Holborn, Sociology Themes and Perspectives, Collins educational, London 1997, pp. 7-9.

⁴ G. M. Vernon, Sociology of Religion, Mc Graw-Hill Book Company, New York, 1962, p. 9.

⁵ Haralambos, op. Cit., pp. 449-450.



Environment and Religions

There has been a number of important recent publications dealing with the relationship between environment and the various religious traditions. There has been an appeal to traditional religions sensibilities in support of environmental issues. It is important to bear in mind that we are concerned with religion in general rather than with any one particular religion's approach about nature is good, the other is false.

Human beings are faced with many issues and problems in life. For example, we have decisions to make about how to prevent our planet from being destroyed. All religions have something to say about this, but they have never agreed completely about how people should act. Briefly, I want to look at what a follower of great religions might think about environmental issues. Of course social scientist deals with the definitions which have been developed by the followers in accordance with their beliefs as to what the supernatural powers dictate or desire. So we can say that religion may play a role in raising social and environmental awareness and values among its followers.

There have been a number of important recent publications dealing with the relationship between environment and the various religions traditions. Now, we can look at the views of some of the great religions at least with respect to their followers about the natural and environmental issues.

In Buddhism, living harmony with nature is central part of it. According to this view there is the feeling in Buddhism that human beings are part of the natural world in which they lived, and they should not be trying to force change upon it. Rather we should seek to live in harmony with it. One would expect Buddhists to be particularly concerned to preserve the natural things on earth.⁶

A book which makes a good introduction to the selectively new topic of Buddhism and environment responds to the new dilemmic situation of contemporary environmental destruction and our responsibility to do something about it. However, countries with large Buddhist population, the teachings of Buddhism have not any visible impact on the environmental distresses.⁷

To Buddhists, the wounded world in which they now live is proof that people have acted selfishly so, in order to protect the world Buddhists would say that collectively, as members of the human family, everyone must now do all they can to heal it.⁸

⁶ J. Rankin, et al., *Ethics and Religions*, Longman, London, 1996, pp. 92-93.

⁷ B. Matthews, "Environmental Philosophy and Ethic in Buddhism", *Pacific Affairs*, v. 75, iss. 1, spring 2001, p. 95.

⁸ A. Forta, et al., *Moral Issues in Six Religions*, Ed. O. Cole, Heinemann, Oxford, 1991, p. 34.



As to Hinduism, the Hindus believe that the whole universe was created by God, so the nature is sacred. The divine is not exterior to creation, but expresses itself through natural phenomena. All of the great natural forces such as the earth, the sky, the air, the water and the fire, as well as plants and trees, forests and animals are all bound to each other with the great rhythms of nature. The universe is given in trust to people for their enjoyment. All creation- oceans, mountains human beings, animals, birds, plants, forests, lakes, rivers- is a part of the creator God and therefore deserves reverence.⁹

Natural environment, forests and groves were considered sacred, and flowering trees received special reverence. Various trees, fruits and plants have special significance in Hindu rituals. The earth is considered as mother, earth and individuals are not really separate in Hinduism. Because this earth is sacred, Hindus offer worship to the plot of land where they plan to build a house.¹⁰

Judaism has maintained that this world is the arena created by god for man. Judaism teaches that this is God's world, that we are entrusted with its care and that we must exercise that care in a moral way. Man was given dominion over nature, but he was commanded to behave towards the rest of creation with justice and compassion. Man lives, always in tension between his power and the limits set by conscience.¹¹

The Torah speaks of human beings being put on this planet to work it and to look after it. The Torah, Talmud and later Jewish writings all give guidelines for doing this. One of the most important is the principle of not destroying anything unnecessarily. Judaism forbids the purposeless destruction of anything. God wanted people to use the world's resources wisely. In Jewish thinking, wasting natural resources are a misuse of the position God has given us.¹²

Christians believe that god created the earth and that human beings are the responsible stewards or managers of creation. They believe that human beings should work wisely to protect what has been given to them, to work with nature and not against it.¹³

In the meantime, human beings are to speak for all creation. They point to the idea that nature only exists to serve humanity, and that humanity as recorded in the Genesis account of creation has some sort of divine right to exploit nature.¹⁴

Christianity teaches that human beings become citizens of both heaven and earth. On earth they have a stewardship of God's creation. That is, they have been given the job of looking after it. Human acts which harm creations are an offence against God the creator.¹⁵

⁹ Ibid.

¹⁰ Ronkin, op. cit., p. 97.

¹¹ Forta, op. cit., p. 182.

¹² Ibid.

¹³ Forta, op. cit., p. 70.

¹⁴ Ibid.

¹⁵ Forta, op. cit., p. 96.



Muslims believe that God has handed the planet over to humankind. Human beings are to be guardians, responsible for every part of it. They are certainly not to damage, pollute or destroy it. On the day of Judgement, Muslims expect to be asked questions about their responsibility towards God's Earth and the creatures on it, and the natural resources (animal, vegetable and mineral) which God has given for them to use and not abuse.

Muslims believe that God has given people free will, and that it is their duty to stop the present suicidal trend of selfish destruction of the Earth's resources. Many Qur'anic verses mention from universe, world, earth, nature, sea, living or lifeless being on earth, soil, river, rain, divine blessings, preserving nature,¹⁶ the nature which is created in balance, succession of night and day, the water that comes down from the sky, giving life to the earth after it had been lifeless, the mountains towering above the earth, the flight of birds.¹⁷

In spite of some common attributes to them all such as having the idea that human beings are God's stewardship. There are some differences between them. While religions have had influence on society they have themselves been influenced by the continually changing world. When we look at the Judeo-Christian outlook we can see easily these differences.

According to Berger,¹⁸ Old Testament theology acted to despiritualize the world. Only God was sacred, and the world was not viewed as being inhabited by spirits. The world was given to humanity to use. This outlook allowed an attitude to develop that God's people have the responsibility to manipulate and control resources. Humanity was instructed to have dominion over the earth, and this attitude allowed for the late development of science and technology. The earth was seen full of huge resources for human beings to use to their own advantage. If problems result, science will find a solution. Maybe science and technologies have been giving us longer life, better health, richer lives etc. but, it has been seen that all the material goods of life will not continue for ever. So it is doubtful whether cleaner environment will be or not.

Environment in Turkish Cultural Heritage

There are cultural elements embedded in Turkish culture about preservation of nature and the formation of environmental consciousness. The cultural activities and rituals which are performed in Nevruz festival and Hıdırellez are some of them. On the other hand the various mythic stories, proverbs, legends and epics have been played an important role in transmission of these cultural elements to the new generations.

I briefly want to mention here from Nevruz and the activities associated with it. Nevruz which has been celebrated in places where Turks have lived for centuries as the celebration of the famous Ergenekon Epic and a Turkish cultural festival indicates the coming of the spring and symbolizes new beginnings. At the same time it is a tradition indicating unity, harmony and peace among the Turkish people and communities. Turks have showed to be respectful toward nature by proclaiming the revival of nature as a feast, an auspicious day and a day of hope, joy, tolerance, brotherhood and friendship.¹⁹

¹⁶ Z. Beyaz, Islam and Environmental Awareness, Posta, 7 October 2006.

¹⁷ R. H. Zillur, "Ecology in Islam: Protection of the Web of Life a Duty for Muslims", The Washington Report on Middle East Affairs, V. X, iss. 4, 1991, p. 67

¹⁸ K. Roberts, Religion in Sociological Perspective, Wadsworth Publishing, California, 1990, p. 305.

¹⁹ President Ahmet Necdet Sezer's Nevruz Message, Radikal, 21 March 2006.



Of course celebrating Nevruz by performing rituals such as lighting a bonfire which symbolizes clearness, mental illumination, affluence, abundance, joyfulness, pleasurable feelings caused by success and the like has been more affective on Turkish people than any other written words. The rituals and cultural activities with Nevruz besides its pedagogical significance and contribution to a particular moral way of life or worldview of the community bring many families together providing opportunities for gathering with relatives, friends and for reaffirming the faith tradition they share.²⁰

These cultural elements make connections with what to be considered valuable dimensions of life and remind us our moral commitments and responsibilities. By the activities associated with Nevruz or other auspicious days, like throwing flowers to water by symbolizing to be against the water pollution, the place of nature in human life is emphasized and the values of charity and mutual respect between human and nature are reminded to people. So, the importance of treating people very well, being cheerful, behaving compassionate toward nature, green, animal, plant and tree are stressed through Nevruz carrying in it many messages. The performing of cultural activity and related ritual has a moral affect; it helps us to understand our connection with others and forces us to some moral action.²¹

According to the ancient Turkish belief system everything either living or lifeless has a spirit. For this reason to be happy they have to respect to the place where they lived. At the same time, the nature is seen as a reflection and sign of God on Earth.²² Turks have behaved very sensitive and extremely careful in the preservation of environment and nature by converting the air, the water, the soil and the fire which are main elements of life to the sacred places.

By making sacred the nature the values such as preservation of nature from destruction, sensitivity other creatures, and to resist the wrong use of natural resources are internalized by people. In Turkish culture, cutting a tree is considered to be equivalent to the great sins and person who cuts a tree or other fresh thing is seen like a murderer. A Turkish proverb states this very well. According to this proverb ‘whoever cuts a fresh thing like tree as if he cuts a head’. So, the “cult of tree” or “cult of nature” among the some Turkish communities has been held very commonly.²³ Of course, the aim of seeing the destruction of nature as a very sinful act is to contribute to the formation of environmental awareness.

In Turkish culture, natural beings are seen as near as family members. The warm relationships are established between human being and nature. The nature has a working law and order for itself. When the balance and order of the nature is spoiled or destroyed by human being it will be great catastrophe for humankind. According to Quran, those who violate the peace with nature will be exposed to the wrath of it, not its blessings.²⁴ Now nature has begun to take revenge on humankind due to abuse of its resources.

²⁰ For ritual and moral pedagogy, see N.Ring, et al. Introduction to the Study of Religions, Orbis books, New York, 1998, pp. 127-129.

²¹ Ring, op. cit., p. 132.

²² Ş. Turan, Türk Kültür Tarihi, Bilgi Yayınevi, Ankara 2000, pp. 135-142.

²³ Turan, op. cit., pp. 143-144.

²⁴ Y. N. Öztürk, Kur'an'ı Anlamaya Doğru, Yeni Boyut, İstanbul, 1990, p. 213.



The environmental issues have emerged as a result of wrong use and exploitation of nature unconsciously by human being. This situation is stated in the Quran thus: “Corruption has appeared in land and sea as an outcome of what men’s hands have wrought: and so He will let them taste the evil of some of their doings, so that they might return to the right path” (Surah 30/41). So human’s spiritual consciousness and ethical considerations are very important in the preservation of balance and scale existing in nature.

The well-known Turkish novelist Cengiz Aytmatov states about this subject in an eloquent manner. The earth with self-sacrifice and productivity like mother embraces all humankind and feeds them. But in return for this generosity the nature wants nothing other than peace, effort and labour. There is no greediness in the philosophy of nature. It can not give meaning to the greediness of human being. We have been created from soil and we will return back to it.²⁵

Of course these statements are expressions and reflections of Turkish culture’s environmental dimensions. Some of the elements of faith which were internalized by communities have been transformed into cultural codes in the course of time.²⁶ According to this rule some of the teachings of Islam related earth and nature would be transformed to cultural codes. For example planting a fruit tree with the intention of eating the human, bird, animal and beast is widely practiced among the Turkish communities. One of the hadiths of Prophet Muhammad says: “If a Muslim plants a tree or sows a field and humans and beasts and birds eat from it all of it is love and charity on his part”.²⁷ This is an example of a religion’s influence on society. It is not forgotten that religion has itself been influenced by the continually changing world. I want to remind here a matter. In fact, this influence is seen in ethical dimension of religion, it is related with the spiritual side of it. So religion has nothing to do with the day to day running of society.

In sum, as Turkish cultural elements the unity, harmony and peace are prominent ones. Besides these, mutual respect, affection and good will are also dominant values embedded in it. To be moderate is primary principle in every kind of works which are done by people, for a man who is considered to be as a part of nature it is emphasized to realize moderate relations between man and nature. That is, to benefit from nature in a rational manner and this rationality must be equated by moral and ethical considerations. In this culture it is essential not to pollute the nature. All of these cultural elements are encouraged because they contribute to inoculate the affection of nature and to form an environmental consciousness among the people.

As aforementioned, since the soil has been conceived like a mother, (soil mother, toprak ana) as an unique character of Turkish culture, soil had been made sacred by giving it spirit and soul. Because to be respectful to mother is seen as a sacred behavior, the same respect must be shown to the earth and nature.

²⁵K. Erbay, Cengiz Aytmatov’un Eserlerinde Tabiat, T.C Kültür Bakanlığı, Ankara, 2002, p.190

²⁶U. Aktan, Turkish revolution, laicity and Islam, Radikal, 13 October 2006.

²⁷ Zillur, op. cit., pp. 65-67; G. Smith, “Islam and the Environment”, Earth Island Journal, V. 17, iss. 2, Summer 2002, p. 26.



Ethical principles and cultural elements are transmitted by various ways to the young generations in Turkish communities. One of the ways of it is mythical narratives. Turks want to preserve the nature through the stories which have environmental themes. As we know it is very common among Turkic communities to express religious beliefs in the form of mythical expressions. Hence these are stories or belief systems that help people understand the nature, the purpose and meaning of life etc. At the same time these narratives help people internalize specific cultural values and social rules. As an example of this form I want to cite here the Lokman Hekim narrative²⁸ which is very popular in Central Asian Turkish Republics. Lokman Hekim, who is a popular medicine, is believed to treat all people. One day he goes out the country to find a herb for treatment of his son. But he could not find it which is looked for treatment of his son's illness. So lack of drug which is made from herb, his son passes away. Lokman Hekim isolates himself from society due to suffering and grief. After one year his door is knocked by a person whose son has a same illness with Hekim's son. He goes out to seek the herb for a drug. This time Lokman Hekim find this herb for other person that the could not find for his son one year ago at the same place. Hekim is pleased and happy for finding it. But he has a passion for its attitude. The herb immediately starts talking. You are in an angry and impetuous manner while looking for us at that time. Your face is not laughing, we were afraid of you as a treatment herb for illness. But now your face is laughing, for that reason we arised fearlessly. As will be seen in this story the love of nature is explained in a clear manner. Of course this kind of stories will contribute to the formation of an environmental ethic and consciousness. To a large degree culture determines how members of society think and feel. It directs their actions and defines their outlook on life. The culture's values, beliefs and rules of conduct are part of lens through which we see the world. By various ways and networks culture's values and rules of conduct passed on from generation to generation with modifying and producing the new ones.²⁹

The faith system of Turks, before conversion to religion of Islam is naturism or shamanism. After acceptance of Islam in a long period, they have preserved some of the ancient faith elements related nature and environment in a new religion.³⁰ The views related earth and nature of Turkish religious belief and values of pre-Islamic period have been united with the new ones. Because Islamic teachings based on the Qur'an and hadiths of Prophet Muhammed about the natural world and the protection of environment are acquaintance to Turkish people. For example balance is very important, the Qur'an says: "God has lifted the heavens up high, and has set up the balance" (Surah 55/7). In a hadith prophet Muhammad said that looking at greenery and sea is a kind of worship.³¹ By elevating this to the worship status, the thinking on the balance and harmony in nature is encouraged. Acting contrary to that order causes chaos and disruption. Muslims believe that God has given people free will, and that it is their duty to stop the present suicidal trend of selfish destruction of the Earth's resources.³² In the Qur'an it is written: "We bestowed on you from on high the ability to make use of iron, in which there is owe some power as well as a source of benefits for men" (Surah 57/25). The power inherent in natural elements if harnessed for destructive rather than beneficial ends, destroy man's sensibility towards other creations".³³

²⁸ H. Yavuz, "Türkistan'da Halkın Manevi Dünyası: Efsanevi İslam", Dergah, V. 6, iss. 62, 1995, p. 12.

²⁹ Ring, op. cit., pp. 97-129.

³⁰ Turan, op. cit., p. 135.

³¹ Öztürk, op. cit., p. 213.

³² Farto, op. cit., p. 138.

³³ Zillur, op. cit., p. 66.



We can deduce from this statement that the unethical use of nature leads to the destruction of environment. On the other, these warnings can contribute to the formation of environmental ethical principles.

As a result we can say something about the reflection of Turkish cultural elements related nature and earth on social life. First of all, these teach us the importance of working together as an indicator of unity. By looking at the harmony and balance we can accomplish goals and working together we can solve our problems. By working in the individual businesses we can legitimate our products at the rate of contributions to the national production. By knowing to act contrary to balance and harmony causes chaos and disruption we can make a plan for life. At the same time, acting rationally we can make the community better. And by trusting in the rightness of our discourse we will enhance the lives of individuals and communities.³⁴

Conclusion

Neo-Liberal or new economy on which globalization is based have a damaging impact on socio-economic structure especially of developing countries. Financier George Soros,³⁵ who has been one of the most successful gamblers in the global casino, has recently begun to refer to the neo-liberal doctrine of economic globalization as “market fundamentalism” and believes that it is as dangerous as any other kind of fundamentalism.

This doctrine ignored its environmental cost, the increase and acceleration of global environmental destruction. Because money-making is the dominant value and one of the tenets of global capitalism, its representatives seek to eliminate environmental regulations under the guise of free trade. The consequence is the destruction and deterioration of the natural environment very much in the name of global free trade.

One of the ways to overcome the dangerous results of globalization on environmental destruction is to rely on our own national culture. Mustafa Kemal Atatürk who is founder of Modern Turkey said in an eloquent manner that whenever a nation relies on its own culture, it does not become hunt of other nations. It is not forgotten that cultural erosion leads to soil erosion and environmental problems. Our culture's values and rules of conduct are part of lens through which we see the world. Culture is resource that attempts to instill the idea of sharedness as well as cohesion among the groups that are separated from each other. For example, various cultural activities related of nature and environment can contribute to the formation of environmental awareness.

To prevent the environment from further destruction, it is a great duty for all people, public institutions, social sector organisations, scholars, community leaders, theologians, entrepreneurs, politicians, social scientists, artists, cultural historians and mass media. With the words of Kaan Benli,³⁶ we could not find a new nature in place of lost one.

³⁴ The reflective dimension of the holiday, see; Ring, op. Cit., p. 93.

³⁵ Capra, op. cit., p. 129.

³⁶ K. Benli, Radikal, 12 October 2006.



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A RAPIDLY RISING TREND: DESIGNING FOR ‘HEALTHY’ HEALTHCARE BUILDINGS

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In this paper, a building type that has ‘health’ as the most important and considered issue in its design has been chosen: Healthcare Buildings. Given the fact that healthcare buildings are designed with the main motivation of ‘making people be and feel well’, then it is vital for this type of buildings to be designed and practiced ‘sustainable, green and healthy’ environments.

Building healthcare environments without materials that are linked to illnesses, that are with healthy food, fresh air, sunlight and that contribute to its environment is becoming vital in the healthcare industry.

Design and construction of ‘healthy’ healthcare buildings affect their users and environment in three levels. These levels can be summarized as;

- the health issues of the healthcare building’s users;
- the health issues of the district and the environment in which the healthcare building is;
- the contribution of the healthcare facility to its environment, community and the city by means of health and resource use.

In the paper, while examining the major systems and tools designed to build a healthy healthcare facility in other countries, a general evaluation of the healthcare guides in Turkey is made. Being in the process of implementing a national accreditation system in Turkey, steps to take in order to implement this significant issue to the national guides for healthcare buildings is identified.

Introduction

Recently, healthcare buildings search to be healthy more than any other building type, because of the radical transformation process from being ‘machines for healing’ to being ‘patient-centered environments’. This shift towards green and healthy healthcare buildings is in harmony with the core value of health care professionals: ‘first, do no harm’. Healthcare sector around the world begun to search for ways to obtain prevention from illnesses, rather than curing them after they arise. One of the feasible and assured ways to obtain public wellness is to implement sustainable design, operation, and maintenance practices in healthcare buildings.

The evidence-based design quantifies the relationship between physical environment and therapeutic outcome. Just as health care professionals diagnose a patient’s illness and prescribe appropriate medicine and treatment, so too are a growing number of architects diagnosing how buildings affect human health and the environment. In response to evidence that, buildings can be significant causes of human illness and environmental degradation, these diagnoses result in prescribing some strategies to minimize these impacts. Given the fact that people feel better due to the design elements of a healthcare facility, designers and entire healthcare sector around the world have started to consider environmental issues thoroughly.



Incorporating sustainable design into healthcare facilities has the potential for high rewards since these facilities are energy and materials intensive and operate 24 hours a day. A study showed that, patients with views of nature went home 3/4 of a day sooner, had a \$500 lower cost per case, used fewer heavy medications and exhibited better emotional well being (Ulrich, 1984).

Health and productivity of workers is also a major cost that can be recovered through healthy building efforts. Literature shows that, good health care facility design helps improve staff recruitment and retention. Healthy building protects the local environment and employee health, and conserves community resources. Financial benefits over the life of the building can well exceed the initial investment to design and construct a green facility.

The Three Levels of Effect

Design and construction of 'healthy' healthcare buildings affect their users and environment in three levels. These levels can be summarized as;

1. the health issues of the healthcare building's users;
2. the health issues of the district and the environment in which the healthcare building is;
3. the contribution of the healthcare facility to its environment, community and the city by means of health and resource use.

As the first level concerns the health issues of the users, protecting the immediate health of building users is one of the major issues in healthy healthcare buildings. This level is also the one that can be achieved in shortest term in existing buildings .

The health of patients, staff, and visitors are affected by the quality of the indoor air which depends on design, the building materials and building operations and maintenance. Access to daylight, fresh air and natural view has been found to affect patient outcomes and staff satisfaction positively (Sungur, 2006).

The second level that a healthcare building affects is, its surrounding community. Air and water quality in the neighborhood is affected by building design. Building materials, construction equipment and HVAC systems may cause allergic attacks, respiratory problems and other illnesses in the environment. Land use and transportation planning, landscape and water conservation efforts within the building will influence the water and air quality and also the quality of life in its surrounding environment.

Caring for the health of the larger community, for instance the city in which the healthcare building is, caring for the region's and country's natural resources have to be also a major concern for a healthy healthcare building as the health impact of a building stretches far beyond its near surrounding. This third level, if not considered, can also risk the health of communities and ecosystems far from their locations. Although this level seems to be in a far distance from our responsibility areas, as in the case of burning fossil fuels that result in climate change, worldwide nutrition, loss of rainforests and damages in the ozone layer, it affects the health of a larger community not just for the life cycle of the buildings, but for centuries after that building is constructed.



Building Healthy Healthcare Facilities

'Healthcare facilities should be sacred spaces—they deal with the essence of life and create a covenant with patients and their loved ones to be centers for healing. Should not children's hospitals be designed free of chemicals that may contribute to asthma, the No. 1 admission diagnosis for children? Should not birthing centers be free of agents linked to birth defects (such as lead, mercury, PFCs, and dioxins)? Should not cancer centers be free of carcinogens?' (Sheely, 2005)

By choosing building materials that are free of hazardous chemicals, offering rooms with views, fresh air and natural light, health care facilities can improve indoor air quality and protect the health of patients and staff.

For the patients who have to be indoors because of illnesses and most of the people who have weak immune systems, the affects of the chemicals in a building can be significant. As these two types of people are the majority of the users of a healthcare building, one has to be very careful about the materials used in a healthcare setting. As well, facility staff and visitors are in the range of potential health effects of poor indoor air quality. These effects are documented in the literature to be in the form of asthma, other respiratory problems, cancer, reproductive and developmental impairment.

Many common construction materials can emit dangerous compounds and harbor infectious molds, fungi and bacteria. Specific materials such as adhesives, carpeting, upholstery, and manufactured wood products emit volatile organic compounds (VOCs), including formaldehyde, a probable human carcinogen. PVC (Polyvinyl chloride or vinyl) products such as in flooring, carpet and wall covering can release a variety of hazardous additives, including endocrine disrupting phthalate plasticizers and heavy metal stabilizers (Vittori, 2002).

The USGBC report specifically recommended "working toward eliminating a class of pollutants" and the GGHC recommends avoiding products that are made from or are responsible for releasing a class of chemicals known as Persistent and Bioaccumulative Toxic Chemicals (PBTs) - like lead, mercury and dioxin. (Guenther, 2005)

In addition to direct health impacts, materials that are to be used in a healthcare building should also involve recycled, reused or/and reusable, recyclable materials and also materials obtained from regional resources.

Green Healthcare Building Guidance Systems Throughout the World

There are numerous studies that have started in the recent years in the world in order to obtain healthcare buildings that are environmentally considered. The major ones that have led this study are: the Green Guide for Health Care that was built upon the Green Healthcare Construction Guidance Statement developed by the American Society for Healthcare Engineering in 2002, the US Green Building Council's Leadership in Energy and Environmental Design (LEED)® rating system, the Australian Green Star rating system, the US Environmental Protection Agency's Energy Star program, the International Organization for Standardization (ISO) 14001 Environmental Performance System, the Minnesota Sustainable Design Guide, Green Building Challenge '98, and BREEAM (Building Research Establishment's Environmental Assessment Method).



Design Strategies for Healthy Healthcare Buildings

Basic principles lying under a green healthcare building can be summarized as; accepting healthcare buildings as environments that directly affect human health and defining buildings as integral parts of a healthy ecosystem through their life cycle. Minimizing water, energy and other sources' consumption is one of the major issues for a sustainable and environmentally considered healthcare building. Another basic principle for a healthy healthcare building is; minimizing the waste, pollution, and toxics associated with the design, construction and operation of buildings. Indoor environmental quality has to be sought in every step of the design, construction and operation phases.

The design strategies for the existing sustainable design guides include most of these environmental topics of:

- integrated design,
- site design,
- water,
- energy,
- indoor environment,
- materials and products,
- waste.

Achieving an effective sustainable design requires an ***integrated design*** approach, which includes a multi-disciplinary process engaging designers, engineers, contractors and users. The ideas supported by the knowledge and needs of all these groups bring multiple benefits. The project team gets the chance to grasp the building as a whole, rather than being stuck in single systems for given parts of the building.

Increasing the cost-effectiveness and building performance by integrating design elements via solving problems in a multi-disciplinary system will be benefits of working in a decision group consisting of the professionals and users who becomes part of the design and operation processes in different points. To achieve an integrated and sustainable design, realizing the responsibilities for environmental and community health, using multi-disciplinary design and decision making, building a team approach, educating this team on the benefits of green design and bringing them in to the design process will be useful.

Construction of a new building on a site affects that site's formation and ecosystem. It is best to avoid agricultural land, threatened or endangered species habitat, wetlands or such sites for new constructions. ***Site design*** has to include preserving or redefining the ecology of a site in an appropriate way. Site design, when considered thoroughly, not only minimizes disruptions such as erosion, habitat displacement and air pollution but also offers access to healthy transportation types such as walking, bicycling and mass transportation. A transportation plan has to be formed in order to use resource efficient modes of transportation. Supporting alternatives to fossil fueled single occupancy vehicles such as designing parking areas for bikes have to be considered. Environmentally sensitive site design also covers solutions of reusing and renovating existing buildings.



Along with preserving or restoring the natural systems and enhancing the natural character of the site, considering water, lighting and natural energy resources is also important for a good site design. Rain water flow off the site must be reduced and water permeable materials have to be used in exterior areas. For heating, cooling, shading or ventilating purposes, local climate have to be taken advantage of. Building orientation has to be designed to use solar energy for heating or daylighting and to allow natural ventilation and passive cooling. Use of trees, plants or other shading techniques can be used to obtain passive cooling and ventilation of buildings and exterior environment where necessary. When the usage of trees or plants is chosen for either shading, or other purposes, it is best to use native trees and plants.

Considering about **water** quality, quantity and sources is one of the major issues of green and sustainable healthcare buildings. Starting from the early phases of design, strategies to reduce water usage and wastewater discharges have to be put. Reducing potable water consumption, reducing the wastewater, greywater and rainwater given out of the building site and reusing these water types are ways to maximize use of water sources within the building and its exterior environment. In order to reach this goal, one must keep in mind that, matching water quality with the purpose of use is of significant importance. For instance, without a filtration effort, site waste water (e.g. gray water) and rain water collected from roofs and site can be recycled by using for irrigation and toilet flushing. Using high performance equipment such as low flow and pressured toilets, low-flow showerheads and faucets and sinks and toilets with automatic flow mechanisms is also another way to reduce water use.

As healthcare facilities are involved, reaching green building's **energy** goals becomes harder than other building types. The burning of fossil fuels is the largest cause of global climate change, as well as toxic emissions that affect the environmental health the community the building is in and the world. Reducing energy consumption of buildings thus reducing air pollution, global warming, and ozone depletion contributes to a healthier world. However, providing a comfortable indoor environment for patient recovery requires a great amount of energy for many purposes. Reducing use of energy by fossil fuels and maximizing use of energy generated by renewable sources are ways to reach the energy goals of green and sustainable building design in healthcare buildings. As stated earlier, designing building orientation in order to get maximum use of natural heating, cooling and ventilation is of great use when reducing energy use is aimed. Designing for appropriate daylighting, using solar energy, using renewable energy systems (such as photovoltaics and wind) and other alternative energy sources, choosing building materials for roofs or other parts of buildings to reduce cooling and heating needs are among ways to reduce energy need for buildings.

Recently, researches about the relationship between **indoor environmental quality** and recovery from illnesses (patient outcomes), well-being, staff satisfaction and productivity have emphasized the need for healthy healthcare buildings.



Providing an environment for users that is physiologically and psychologically healthy is fundamental for healthcare buildings. Daylight, access to views, natural environment, comfortable indoor climate and appropriate acoustical conditions are necessary to obtain such environments. Providing operational control of systems to users (such as light, view, thermal, ventilation), providing appropriate air changes with sufficient percentage of fresh air, avoiding materials that are known as allergens, mutagens, carcinogens and so on, are of significant value for healthy buildings. Also minimizing use of materials that absorb and release indoor pollutants or that allow microbial growth, ventilating areas such as smoking areas, copying rooms, hazardous waste are among actions to be taken.

Use of carefully chosen *materials and products* also can significantly enhance a building's environmental health performance. Minimizing production of persistent and bioaccumulative toxics (PBTs) and reducing waste as priorities for the healthcare industry. Avoiding materials that cause harmful health affects such as materials that include mercury (switching equipment), arsenic (pressure treated wood), urea formaldehyde (engineered wood), PVC (floors, wall coverings, furniture, roof membranes, plumbing pipe, electrical wire), and asbestos, is a priority for healthcare industry.

Along with avoiding harmful materials, use of recycled, reused or obtained from renewing local sustainable sources, easily reusable and recyclable materials have to be considered. Design for adaptability and future flexibility of building design as user needs change is another top priority.

Waste management of green and healthy buildings include; reducing and recycling packaging waste and waste from users, reducing and properly disposing of hazardous waste produced within the building.

Arguments and Suggestions for Turkey

Establishing healthy and environmentally sensitive buildings via design decisions and material selections provide measurable benefits in patient outcomes, improved staff satisfaction and productivity, reduced operations and maintenance costs. Promoting the health of users while operating economically and efficiently can be achieved by making design decisions in favour of the environmental and psycho-social issues. Some of the best design and ecological benefits occur when design considerations combine with other concerns such as the relationship between environmental impacts, human experience, economics, and design aesthetics.

In order to maximize the health and sustainability of healthcare facilities, demand is growing for a design tool specifically developed to maximize the health and sustainability of health care facilities in the healthcare sectors of the world.

This recognition should trigger immediate review and modification of existing healthcare buildings' guidelines, policies and material specifications for Turkey. One appropriate place to start for immediate impact is in the specifying of environmentally agreeable interior materials that will help enhance indoor air quality and toxin reduction.



After this immediate action to be taken, guides and standards can then expand out to other areas to reach to a sustainable healthcare facility that can be listed as: integrated design, site design, water, energy, indoor environment, materials, products and waste.

When guides and specifications are formed as a national system, it is also possible to use healthcare facilities around the country as case studies for continuous development. This approach may help to create a system that can easily grow and change as more experience and new information becomes available.

A Guide as a tool to learn about sustainability, consider design decisions, and integrate sustainable design into the building design and operation processes for new and renovated facilities has to be developed for Turkey. The design guide can be formed to lead design and during the *planning*, *design*, and *construction* phases and to lead building use during the *occupancy* phase.

A checklist of issues needed be in accordance with during each phase of the process also has to be formed. This will give architect the information required to reach the sustainable design goals at particular stages of design. The three levels of effect that is explained earlier have to be identified in detail in the checklist. This checklist is also essential in order to realize standards concerning sustainability in the national accreditation system to be formed in the future.

The checklist to be formed can also contain a scoring system that provides the architects and other professionals to evaluate their buildings. A national benchmark system can easily be based on this scoring system. This benchmarking will let professionals and users of healthcare buildings to be aware of the current conditions of healthcare facilities and also to provide the opportunity to change for the better.

In addition, current training systems for architects and engineers are insufficient to inform environmental and human health considerations for buildings, thus causing architects to graduate without the knowledge and awareness of this significant issue. There is a need to educate architects, building owners and users about the concepts, goals and significance of healthy and sustainable design.

A complete integrated approach for 'healthy' healthcare buildings will help the healthcare facility to fulfill its responsibility for the health of its patients.

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ASSESSMENT OF BEHAVIOUR AND ATTITUDES OF RURAL PEOPLE TOWARDS ENVIRONMENTAL ISSUES: CASE OF TURKEY

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This study carried out in Turkey provides useful insights into the environmental behaviour and attitudes of rural dwellers. One hundred and twenty rural dwellers were questioned. Chi-square test (χ^2) was used in the study. It was found that there was a statistically significant relationship between residence area and attending environmental activities ($P=0.074$), and also between education and producing/consuming organic products ($P=0.080$). Results show that excess use of agrochemicals, stubble burning, deforestation, domestic waste, decreasing pasture land, use of agricultural lands are the common environmental pollution existing in many rural areas at medium or high level. In the light of this information, it can be said that socio-demographic, economic and cultural characteristics of the rural dwellers should be taken into account while making environmental policies.

Keywords: rural people, behaviour, attitude, environmental issues, Turkey

INTRODUCTION

Mankind constantly derives benefits from nature to provide their needs. Environment has basically been used to expand the habitat and improve quality of life (Sudarmati et al., 2001). In this stage, human being may damage to nature with or without knowing its negative effects which may be emerged in the future on his/her life.

Industrial revolution is a milestone in the starting of environmental pollution as a prevalent feature of the today's world (Abdul-Wahab and Al-Arairni, 2004; Yilmaz, 2006). In addition, population increase, unplanned urbanisation, rapid development of technology, increasing demand for industrial products, and more research leading to more discoveries created local and regional stress through such elements as swage disposal, mineral extraction, energy conservation and sprawl of urban-industrial activities over the adjacent rural land (Buchwald, 1980; Kemp, 1998). As starting 1960s the negative effects of environmental problems on human health, flora (plants), fauna (animals), and other lifeless assets have reached dangerous dimensions especially in developed countries (Esengun et al., 1999; Akay et al., 2000). Therefore, today, environmental issues are one of the most important topics (others are: poverty, malnutrition, energy bottleneck, wars, etc) given priority in the public agenda of the world (Sayili et al., 2000; Karaer and Gurluk, 2003).



Agriculture is the main source of livelihood for rural dwellers, and constitutes the cornerstone in many countries' economy. It is a fact that farming leads to positive or negative externality. That is, agriculture determines not only the ecological quality but also the aesthetic appeal of the rural countryside. Therefore, as starting in the last quarter of 20th century, environmental issues have constituted the agenda of rural dwellers, rural sociologists, agricultural scientists and agricultural economists throughout the world. However, scientific studies show that number of studies explaining knowledge, behaviour, attitude, awareness, and perceptions of rural people towards environmental issues is very limited in Turkey. Therefore, the main aims of this study were to i) explain the relationship between rural life, agricultural activity, and environment, ii) assess behaviour and attitude of rural dwellers towards environmental issues, and iii) reflect the ideas of rural people about the solution of environmental problems.

MATERIAL AND METHODS

A survey was carried out in villages, towns, and counties of Konya and Nigde provinces (Central Anatolian Region), Bayburt, Ordu and Trabzon provinces (Black Sea Region), Adana province (Mediterranean Region), Bursa province (Marmara Region), Manisa province (Eagean Region), Gaziantep province (Southeastern Anatolian Region). The questionnaire was carried out with 137 rural dwellers in September 2006. Sampled respondents were selected randomly. Seventeen questionnaires were excluded from further analysis due to having unanswered or ambiguously answered key questions that not be clarified. After these screenings, a total of 120 questionnaires were remained to evaluate by authors. All analyses were performed using the Statistical Package for Social Sciences (SPSS 10.0). Statistical analysis included frequency distributions and chi-square test.

Chi-square test (χ^2) was used while analyzing the relationship between socio-demographic characteristics of the respondents and environmental friendly activities. All analyses were conducted A 0.10 significance level was conducted for all analyses. Formula of Chi-square is as follows:

$$\chi^2 = \sum_{i=1}^k \frac{(O_i - E_i)^2}{E_i}$$

Where O_i is the observed frequency in class or interval i and E_i is the frequency expected in class i on the basis of the hypothesised distribution, say, and the normal (**Gujarati, 1995; Mirer, 1995**).

The questionnaire comprises five dimensions. First part of the questionnaire was designed to collect information on the respondents' sex, age, education, type of settlement unit, and membership to environmental organisations. In the second part, respondents were asked to explain the level of environmental problems existed in their residence area. Third part of the survey contained questions on behaviour and attitude of rural dwellers. Main information sources benefited by rural dwellers were asked in the fourth section of the questionnaire. In the last section, the ideas of respondents about the actors/activities which may play active role to raise awareness of rural dwellers to environmental issues were questioned.



RESEARCH FINDINGS

Socio-demographic characteristics of the respondents

General profile of the respondents was summarised in Table 1. Results of the study show that 90.80% of the surveyed people were male. Rural sociologists state that gathering information from rural women in some regions of Turkey is very difficult because Turkish culture is a male-dominated one (Tuncer et al., 2005). Therefore, in this study the ratio of female surveyed was very low (9.20%).

Only respondents of 18 or more years in age participated in the survey. The participants were a convenience sample of 120 respondents ranging in age from 19 to 88 years with average age of 40.02 years. Middle age group constitutes nearly 61% of the respondents.

As far as educational level is concerned, over half of the respondents (57.50%) had elementary school diploma. About 30.80% of the sampled graduated from high school. The rest had university degree (including agricultural engineers working as consultant in villages).

Frequency distributions indicate that 71.70% of the respondents live in villages while the rest live in counties (20.00%), and towns (8.30%).

Out of 120 respondents, only 2.50% of them are the member of environmental organisations (i.e. TEMA, ÇEKÜL, etc).

	(n=120)	%
<u>Gender</u>		
Male	109	90.80
Female	11	9.20
<u>Age (years)</u>		
Less than 31	26	21.70
31-50	73	60.80
51 and more	21	17.50
<u>Education level</u>		
Elementary school (8 years)	69	57.50
High school (3 years)	37	30.80
University (2-4 years)	14	11.70
<u>Residence area</u>		
District	24	20.00
Town	10	8.30
Village	86	71.70
<u>Membership to organisations</u>		
Yes	3	2.50
No	117	97.50

Table 1. General profile of the respondents



Type and level of environmental problems

According to **Kibert (2000)**, **Girdner and Akis (1996)**, and **Akay et al (2000)**, loss of biodiversity, deforestation, ozone depletion, global climate change, pollution and over-consumption of natural resources are the main environmental problems existing in global base. On the other hand, at the beginning of the 21st Century, the most significant environmental problems in Turkey may be classified into eight groups: air pollution, water pollution, soil pollution and degradation, solid waste disposal, noise pollution, negative effect on flora and fauna, pesticide, and energy (**Anonymous, 1998**). In the light of this information, researchers decided to determine “view of rural people about type and level of environmental problems in their settlement units”. Results of the survey are given in Table 2. According to 37.50% of the respondents, there was a household rubbish and garbage problem at medium level in rural areas. Nearly one-fifth said no littering problem.

About 70% of the surveyed people stated there was no radiation problem in their villages. Only rural dwellers living in Black Sea Region stated radiation problem at medium-high-excess level due to severe effects of Chernobyl nuclear accident on human being, animals, and plants.

Air pollution comes from many different sources such as factories, power plants, cars, buses, trucks and even windblown dust and wildfires. It can threaten the health of human beings (**EPA, 2005**). It generally exists in cities or metropolitan areas but in sometimes it can be a problem of rural areas. About 45% of the respondents think that there is no air pollution in rural settlement units. The percentages of people who think existing of air pollution are 29.20% at low, 20.80% at medium level. The rest (5%) declared it high and excess level.

Over half of the respondents are not worried about “noise pollution”. Only villages located near the motorway were affected from this problem especially in summer seasons due to crowded traffic.

In Turkey, factories are generally established near to cities or main roads. As far as rural industry is concerned, except for marble and bracket plants, it is not well developed in Turkey, compared to industrial western countries. Therefore, negative effect of industrial waste is at low level or not. Result of this study supports above idea because 53.30% of the respondents said that there was no industrial waste problem.



Type of environmental problems	Level of environmental problems (%)				
	None	Low	Medium	High	Excess
Household rubbish and garbage	20.8	31.7	37.5	5.8	4.2
Air pollution	45.0	29.2	20.8	4.2	0.8
Water pollution	23.3	43.3	20.0	8.4	5.0
Noise pollution	58.3	14.2	18.4	5.8	3.3
Soil pollution	35.0	32.5	22.5	1.7	8.3
Utilising agricultural lands for different aims	30.0	31.6	29.2	4.2	5.0
Erosion (wind, water, soil)	33.3	38.3	15.0	6.7	6.7
Deforestation	27.5	20.0	32.5	16.7	3.3
Decreasing pasture land	22.5	29.2	28.3	13.3	6.7
Stubble burning	14.2	28.3	15.0	30.8	11.7
Industrial wastes	53.3	21.7	17.5	5.8	1.7
Radiation pollution	70.0	25.8	1.7	0.8	1.7
Pollution created by tourism	66.7	20.0	8.3	5.0	0.0
Excess use of agrochemicals	18.3	19.2	34.2	26.7	1.7
Over-hunting	26.7	40.0	20.0	10.0	3.3
Pollution by animal barns	17.5	42.5	21.7	14.2	4.2

Table 2. Type and level of environmental problems in rural areas

Water is essential for life and plays a vital role in the functioning of Earth's ecosystems. Pollution of water has a serious impact on all living creature (**EPA, 2005**). Nearly 43% of the survey respondents think their residence area has water pollution problem at low level. According to one-fourth of the rural dwellers, there is no water pollution problem in the research area.

Soil is the most important and also essential input in agriculture. Its misuse is the main reason behind the environmental problems of rural areas. In addition, excess use agrochemicals leads to destruction of micro-organisms in the soil (**Onder, 2006**). Survey result shows that rural areas face soil pollution problem (low level: 32.50%, medium level: 22.50%). Only one-tenth of the respondents state that level of soil pollution is very serious. Utilising agricultural lands for different aims (i.e. establishment of houses, obtaining raw material for brackets, etc) is another dimension of soil problem in western part of Turkey.

Over-hunting is a danger for surviving of wild animals in forest area and fishery products in rivers, lakes and sea. In the sampled area, over-hunting is a problem at low level and at the beginning stage. But the future of ecosystem this problem should be solved by the legal regulations made by ministry of environment and forestry.

Relationship between agricultural activity and environment

There are two sides of the medallion. On the one hand, wrong agricultural application (i.e. excess fertiliser and pesticides use, unsuitable soil tillage, etc) is one of the main causes of environmental problems. On the other hand, it is the victim of severe environmental problems (**Esengun et al., 1999**). This situation was examined via asking some questions related to effect of agricultural activity on rural residence. Results were given in Table 2 and explained in the following paragraphs.



Stubble burning is still an important problem in many rural areas of Turkey although it is forbidden by the government with legal regulations. Nearly one-third of the respondents identified stubble burning as environmental problem in their residence unit.

Agrochemical use is a problem in Turkey. In the research area, level of environmental problems caused by unbalanced fertiliser/pesticides use is medium (34.20%), high (26.70%), low (19.20%), and excess (1.70%). The rest (18.30%) said “no problem”.

Animal husbandry is one of the main activities carried out in rural areas. It can be a cause of negative externality if enough precautions are not taken into consideration while doing cattle fattening. In order to determine whether there is a pollution caused by animal farms in Turkey or not, rural dwellers were questioned. Their answers were no (17.50%), at low level (42.50%), medium (21.70%), high (14.20%), and maximum (4.20%).

Growing fodder crops as kind and amount is very low in Turkey, compared to developed countries. In order to solve foodstuff problem in Turkey households engaged in animal husbandry use pasture land intensively. This leads to overgrazing problem and decreasing quality of pasture land. About 78% of the rural areas face over grazing problem at different level.

Behaviour of rural dwellers toward environmental conservation

It is argued that enhanced awareness of environmental issues may help to promote better behaviour with regard to conservation of the environment. Behaviour is the percentage of respondents who answered that they had been deliberate action” to protect the environment at some point in their life (**Barrett et al., 2002**). Some questions were asked to rural dwellers to determine behaviour of rural people towards environmental conservation. Results were given in Table 3. About 86% of the rural people always turn off lights when they are not being used to save electricity. The rest do it generally.

Only 8.30% of the surveyed people try to turn off water while saving or brushing tooth. This is a bad behaviour to save water or reduce water consumption for environmental reasons.

Nearly 92% state that they separate paper/plastic waste from other waste at home. But main problem is here that households generally burn them. On the other hand, vegetable and fruit waste are given to animals as food.

Many Turkish farmers use agrochemicals (fertiliser/pesticides) in agricultural activity to increase yield per unit, prevent plants/crops from pesticides and weeds, and isolate animals from disease. While making this, in many regions of the country, they do not take into account negative effects of agrochemicals on human and animal health in the long run due to not having enough information. This idea is supported by the results of this study. Only small part of the farmers (always: 10.80%; generally: 12.50%) keep control agrochemical packages after using it. The rest do not it.



Type of behaviour	%			
	Always	Generally	Seldom	None
I turn off lights when they are not being used	85.80	14.20	---	---
I turn off water while shaving / brushing tooth	8.30	15.80	10.80	65.00
I separate paper/plastic waste from others at home	91.70	4.20	3.30	0.80
I keep control agro-chemical package after using it	10.80	12.50	15.00	61.70

Table 3. Behaviour of respondents towards environmental conservation

Environmental information sources

Table 4 shows that great majority of the respondents acquire environmental information mostly from television (88.33%). This was followed by radio (50.00%), and school (44.17%). Other information sources benefited by the respondents were leader farmers in the region (28.33%), extension staff (27.50%), newspaper (23.33%), health centres in their residence area (20.00%), private sectors selling seed and agrochemicals (14.17%), NGOs such as cooperatives and trusts (10.00%). Only 5.00% of the sampled people used Internet in order to obtain environmental information. When analysed who used internet for information source, the agricultural consultants working in villages were found.

Information sources	Frequency	%
Television	106	88.33
Radio	60	50.00
School	53	44.17
Magazine	11	9.16
Leader farmers	34	28.33
Extension staff	33	27.50
Newspaper	28	23.33
Private sector	17	14.17
Health centres	24	20.00
Non-Governmental Organisations	12	10.00
Internet	6	5.00

Table 4. Sources of Environmental Information for Respondents (*)

(*) more than one answer

Actions to raise environmental conscious

Educated people are the leaders in adopting new environmental friendly technologies in any society (Ali, 2002). Environmental education may play a very important role in improving the environmental literacy which consists of peoples' perception, knowledge, attitude, and behaviour toward environmental issues (Hens, 2004). Above view is supported by this study. Radio/television programme (77.50%) is the most important activity to raise awareness of rural people to environmental issues. When you ask its reason to the respondents, they explain that agricultural activity is in the least level during winter season, therefore, they have enough time to watch television/listen to radio, and discuss environmental issues broadly in village cafés or friend meetings (Table 5).



Actions	Frequency	%
Education within family	89	74.17
Education at school	84	70.00
Conference/meeting/seminar	13	10.83
Television-radio programmes	93	77.50
Activities organized by NGOs	35	29.17
Legal regulations	26	21.67
Newspaper-magazine	39	32.50
Drawing and music competitions	7	5.83
Youth Camps	11	9.17

Table 5. Actions to raise environmental conscious (*)

(*) more than one answer

Environmental educations within family and at school are the second (74.17%), and third (70.00%) actors. They can be efficient to increase awareness of rural people to environmental issues and to found solutions for environmental problems in their residence area. Other actors can be summarised as newspaper/magazine (32.50%), activities organised by NGOs (29.17%), legal regulations (21.67%), seminar (10.83%), youth camps (9.17%), and drawing and music competitions organised by government organisations in “world environment day” (5.83%).

Environmental attitudes of rural people

One of the most important determinants of behaviour is attitude (**Kraus, 1995**). Environmental attitude can be defined as “a learned predisposition to respond consistently favourable or unfavourable manner with respect to the environment” (**Pelstring, 1997; Fishbein and Ajzen, 1975**).

One of the main aims of this study is to provide useful insights into the environmental attitudes of rural people. In this study, “attending environmental activity” and “producing and consuming organic products” were taken into consideration for environmental attitudes of rural dwellers. Nearly 28% of the respondents had not been involved any environmental activities (i.e. planting tree, collecting rubbish and garbage, etc), so far. Nearly 18% of people had attended planting tree activities many times. Just over half of the respondents said sometimes. As far as organic farming is concerned, one-fourth of the respondents said they had not produced or consumed organic foods having certificate. Only 14% take into account production and consumption of organic products but none of them had organic products production certificate. They heart this concept from extension staff or television programme.

Assessment of rural dwellers’ attitudes toward environmental issues with respect to their socio-demographics characteristics was analysed via chi-square test and results were given in Table 6.



		Attending Environmental Activity					Producing/Consuming Organic Product				
		A	G	S	N	Total	A	G	S	N	Total
Age (years)	18-30	7	6	4	9	26	4	14	5	3	26
	31-50	9	31	14	19	73	10	28	14	21	73
	51 +	5	5	5	6	21	3	4	7	7	21
	Total	21	42	23	34	120	17	46	26	31	120
	Result	$\chi^2_c = 6.812$, df = 6, P = 0.339					$\chi^2_c = 8.065$, df = 6, P = 0.233				
Education	Elementary	12	27	9	21	69	9	23	16	21	69
	High school	7	9	11	10	37	5	18	4	10	37
	University	2	6	3	3	14	3	5	6	0	14
	Total	21	42	23	34	120	17	46	26	31	120
	Result	$\chi^2_c = 5.820$, df = 6, P = 0.444					$\chi^2_c = 11.286$, df = 6, P = 0.080				
Residence Unit	County	2	12	1	9	24	3	8	4	9	24
	Town	4	3	1	2	10	1	8	0	1	10
	Village	15	27	21	23	86	13	30	22	21	86
	Total	21	42	23	34	120	17	46	26	31	120
	Result	$\chi^2_c = 11.506$, df = 6, P = 0.074					$\chi^2_c = 10.530$, df = 6, P = 0.104				

Table 6. Relationship between socio-demographic characteristics and environmental attitude

It was found that there was a statistically significant relationship between residence area and attending environmental activities (P= 0.074), and also between education and producing/consuming organic products (P= 0.080).

No statistically significant relationship was found between age of respondents and attending environmental activities (P= 0.339), and between education and attending environmental activities (P= 0.444).

As far as environment friendly products or healthy foods is concerned, there was no statistically significant relationship between producing/consuming organic products and age of rural people (P= 0.233), and between type of residence unit and production/consumption of organic products (P=0.104).



CONCLUSION

Environment is a heritage of our forefather to us. And also it is a safe-keeping to be handed over to future generation after using it carefully and safely. Polluting environment do not affect only us but also future of our children. Therefore, sensitivity for environmental conservation should be started at home firstly, and later it should continue local, regional, national and international level.

There is a need to analysis the reasons and results of environmental problems in both rural and urban areas in order to diminish negative effects of environmental problems on human being, economic and social life of the society, animal health, degradation of natural resources, etc.

To sum up, excess use of agrochemicals, stubble burning, deforestation, domestic waste, decreasing pasture land, use of agricultural lands are the common environmental pollution existing in many rural areas at medium or high level. In the light of this information, it can be said that socio-demographic, economic and cultural characteristics of the rural dwellers should be taken into account while making environmental policies.

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RANGELANDS OF BALOCHISTAN IN GLOBAL PERSPECTIVE OF CLIMATE CHANGE AND INTERNATIONAL INSTITUTIONS: SINCE 1990

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Rangelands of Balochistan in Global Perspective of Climate Change and International Institutions: Since 1990

As the dominating facts are: the arctic ice is melting, global mean sea levels have risen 10 to 15 centimeters in the past century, sea levels have reached their highest in 5, 000 years, and are rising now at a rate 10 times faster than the average during that period. The 1990's were the hottest decade since measurements started in the 1860's, 1998 was hotter than any year before. Surface air temperatures around the world are higher now than a century ago. Human demand (or Ecological Footprints) in 1961 was about 70 percent of the Earth's regenerative capacity. By the 1980's demand had risen to match total global supply, and by 1999 demand exceeded supply by at least twenty percent. It takes the biosphere, therefore, at least a year and three months to renew what humanity uses in a single year.

It seems that global climate trends will tremendously affect the future socio-economic politics of the world. The hypothesis established for this research is, "*The physical environment is degenerating in Balochistan; therefore, there is a need to highlight the pertinent environmental issues*". This paper intends to assess the natural resources of Balochistan by giving a proper highlight to global climate change -----its causes and impacts.

The concept of this paper is based on the need to focus on rangelands of Balochistan surrounded by different local, provincial, national and international factors, effecting the situation. The Third World stands more vulnerable to global warming and sequenced food insecurity. In this backdrop the paper descends upon food & livelihood security in Balochistan.

This paper investigates global climate change and politics as causative factor of rangeland degradation of Balochistan. The paper is divided into five sections: following introduction section 2 discusses climate change profile comprised of indicators of climate change and causes of climate change. Section 3 evaluates the rangeland issues, livelihood and food security in Balochistan vis-à-vis rangeland degradation and drought. Section 4 assesses adaptation as necessary strategy at all scales to complement climate change mitigation. It also examines Participatory Upland Conservation Development project 1992-1997 as an example to be followed locally while thinking globally, section 5 concludes the paper.

A Strategy for Sustainable Living-presented by IUCN, UNEP, WWF, 1991 upholds caring for earth. The Rio Conference of United Nations for Environment and development held in 1992 proclaimed in its principles, 1, 2, 3, 4, 7, 11, the protection and the sustainability of the environment for human betterment and economic development.



The IMF, the OECD, the United Nations, and the World Bank Group have jointly adopted the International Development Goals set forth in Millennium Declaration of 2000, the seventh goal is, "Implement national strategies for sustainable development by 2005, so as to reverse the loss of environmental resources by 2015".

II. Climate Change Profile

The increasing evidence that certain human activities, such as burning of fossil fuels, conversion of forests to agricultural land at unprecedented rates and other activities are causing significant increases in the level of carbon dioxide (CO₂) and other "Greenhouse gases" in the atmosphere-the effect is climate change and global warming (Houghton, 1990). These changes could have serious implications for agriculture (particularly rangelands), fisheries, forestry and human development.

The two questions have come into existence because of this climate change as follows:

1. How will a changing climate affect the abilities of human societies to maintain and enhance their quality of life?
2. What actions can be taken to adapt to or mitigate the effects of climate change?

The dominant feature of natural resources of Balochistan is rangeland. The food security and livelihood security depends on rangeland potential.

According to National Commission on Agriculture (1988) rangelands occupy 52.2 m ha, which is about 60% of the total land surface of the country. More than 50% of the total rangeland (27.40 m ha) is in Balochistan, which supports most of its economy. So both the above questions would be dealt with reference to rangelands.

Climate change associated with global warming in it self is not uncertain hypothesis but a virtual certainty. Its degree, rate, and consequences seem unpredictable. To explore the complexities and establish best estimates of the possible implications of climate change in 1988 governments established the Inter-governmental Panel on Climate Change (IPCC)*1.

Its first report in 1990 confirmed scientific concern, and updates in 1992 and 1994 added many important details. In December 1995, governments accepted the IPCC full Second Assessment Report (SAR). The likely impact of climate change on a country like Pakistan- is some additional warming and possibility of changes in rainfall and storm paths and intensities is clearly of great concern. Indeed, one of the more consistent projections among climate models is the finding of net soil drying in many already arid sub-tropical regions, and a likely shift in the distribution of global agricultural production, with relative decline in the developing world.



Environmental institutions, laws and their binding force: The political process to address climate change began in 1988 and 1989, when the UN General Assembly decided that climate change was a, "common concern of mankind", and urged governments, intergovernmental and non governmental organizations to treat climate change as a priority issue. In December 1990, General Assembly established the intergovernmental Negotiating Committee (INC) for a Framework Convention on Climate Change. The text of UNFCCC was adopted in May 1992 in time for it to be signed at the United Nations, "Earth Summit", held in Rio de Janeiro in June of the same year (John Bodansky, 1993).

Indicators of Climate Change

Undoubtedly the earth planet is getting warmer; many sources are available in this respect at global level. To reflect upon this fact in relation to Balochistan the data has become available only about Quetta city-but the change of climate is synonymous in other parts of the province. To valuate the climate change in Balochistan people from different communities have been interviewed to shed light on climate change and its effect on their living standard.

The global average surface temperature has increased over the 20th century by about 06 Celsius: The global average surface temperature (the average of near surface air temperature over land, and sea surface temperature) has increased since 1861. Over the 20th century the increase has been 0.6+0.2 Celsius. A quick look at Table 1 would prove the fact that temperatures are gone up.

	JAN	FEB	MAR	APR	MAY	JUN	
Max	11.6	11.8	17.8	23.8	32.2	33.4	1990
Min	4.6	2.3	4.5	11.3	17.9	20.3	
Max	11.8	13.6	16.3	24.3	30.3	35.2	1995
Min	-0.7	2.0	4.3	10.7	14.9	19.6	
Max	12.4	15.1	20.5	27.9	35.0	36.4	2001
Min	-2.8	0.8	6.0	11.8	18.8	20.8	

	JUL	AUG	SEP	OCT	NOV	DEC	
Max	36.4	35.1	32.5	24.3	22.8	12.1	1990
Min	21.9	25.4	15.3	10.0	5.9	-7.7	
Max	35.5	35.9	31.6	25.8	20.9	10.8	1995
Min	21.5	20.1	13.9	10.0	3.7	1.1	
Max	36.9	35.2	31.7	27.9	21.7	16.9	2001
Min	22.7	19.6	14.6	10.1	4.3	3.5	

Table. 1. Temperature Profile of Quetta City of Selected Years in Celsius

Source: MET Data Geophysical Center Quetta, 2002.



Snow cover and ice extent have been decreased: Satellite data shows that it is very likely to have been decreases of about 10 percent in the extent of snow cover since the late 1960's and ground based observations show that there is very likely to have been a reduction of about two weeks in the annual duration of lake and river ice cover in the mid and high latitudes of the Northern Hemisphere, over the 20th century. (See Box. 1)

Global average sea level has risen and ocean heat has increased: The gauged data show that global average sea level rose between 0.1 and 0.2 meters during the 20th century. Global Ocean content has increased since the late 1950's.

Box. 1. Observational Evidence about Snow in Quetta Valley

In Quetta valley it has been observed that in sixties and seventies the winter started in late September prolonged up to May, and there was snowfall up to two to three feet, the mountains were covered with snow. Now the winters come in December and remain intact only up to February and snow happens negligibly two to three inches in adjacent areas of Quetta only up to two three inches.

Changes have also occurred in other important aspects of climate: It is very likely that precipitation has increased by 0.5 to 1 percent per decade in the 20th century over most mid and high altitude of the Northern Hemisphere continents and it is likely that rainfall has decreased by 0.2 to 0.3 percent per decade over the tropical (10°N to 10°S) land areas. It is also likely that rainfall has decreased over much of the Northern Hemisphere sub-tropical (10°N to 30°N) land areas during the 20th century by about 0.3 percent per decade. In some regions, such as parts of Asia and Africa, the frequency of droughts has been observed to increase in recent decades.

The monsoon system fails to reach the northwest and western ends of its cycle, which includes India and Bangladesh but loses its intensity while still its way to the western and northwestern regions that includes Pakistan.

The system of push from the Bay of Bengal and pull from Central India onwards to the west and northwest, bifurcation of the monsoon system from Central India at Jhansi into two branches, one going west to Sindh and the other going to northwest to the northern areas of Pakistan are not being observed for the past few years. In proceeding west, the system either loses the driving force to push rain clouds to the west or the pull of the low-pressure zone over Sindh and *Balochistan* diffuses and offers no attraction. (Ali Beg, 2001).

For comparison purpose the years of 1990, 1995, and 2001 are selected to evaluate the precipitation trend in Quetta city. According to the precipitation trend Quetta is a moderate place of the province. With few variations the whole province carries the same met line since 1990 (See Table. 2).



Causes of Climate Change

The dominant factor of free market and conflict management economics in policy designs of international

Institutions (intergovernmental international institutions, non governmental International institutions, and multinational corporations) imposes unhindered exploitation of natural resources, the emissions of greenhouse gases and aerosols due to human activities are affecting the climate.

	JAN	FEB	MAR	APR	MAY	JUNE	YEAR
Rain mm	114.1	95.5	44.0	5.0	4.6	0.0	1990
-	30.0	39.2	23.5	34.4	2.1	0.0	1995
-	0.6	23.7	35.2	31.9	0.0	0.0	2001

	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Rain Mm	0.0	0.0	0.0	0.0	0.0	54.1	1990
	103.9	2.0	0.0	13.7	2.5	106.5	1995
	3.6	3.6	0.0	0.0	0.0	27.9	2001

Table. 2. Rain Profile of Quetta City of Selected Years

Source: Meteorological Data Geophysical Center Quetta. 2002

Emissions of Greenhouse gases and aerosols due to human activities continue to alter the atmosphere in ways that are expected to affect the climate. Changes in climate occur as a result of internal variability in climate system and external factors (both natural and anthropogenic).

Concentrations of atmospheric greenhouse gases and their radioactive forcing*2 have continued to increase as a result of human activities. About three-quarters of the anthropogenic emissions of CO₂ to the atmosphere during the past 20 years are due to fossil fuel burning. The rest 25 percent is predominantly due to land use change, especially deforestation. Since 1995, the atmospheric concentrations of many of those halocarbon gases that are ozone-depletion and greenhouse gases (e.g., CFC13 and CF₂C12), are either increasing more slowly or decreasing, in response to reduced emissions under the regulations of the Montreal Protocol and its amendments. There substitute compounds (e.g., CHF₂CI and CF₃CH₂F) and some other synthetic compounds (e.g., per fluorocarbons (PFC) and sulphur hexafluoride (SF₆) are also greenhouse gases, and their concentrations are currently increasing (IPCC-Working Group 1 Reports, 1992, 1997, 2001)



Western notion of progress would cause environmental pollution because it means industrialization. It would, sever indigenous peoples from their cultural roots and expose them as helpless victims to a global exploitative capitalism that urged them to consume the wrong things for the wrong reasons with the money that they did not have (Shurman, 1998). Free market, economic growth, and consumerism practices as part of capitalism increase the burden on natural resources.

International Financial Institutions Conditionalities, and Unfair Terms of Trade: Carolyn Somerville in *Drought and Aid- A decade of Development Cooperation* concludes that the impact of indirect factors (unfavorable terms of trade) is still unclear. Yet she identifies unfavorable international terms of trade for primary products and the policies of aid donors as reinforcing pressures, which could encourage increasing cash crop production at any cost. This cultivation of cash crops on unsuitable rangelands could be forcing herders and their cattle onto marginal lands (thereby contributing to desertification) (UNEP, 2002).

Balochistan as being the integral part of Pakistan economy (Pakistan economy is under great burden of International Financial Institutions conditionalities since 1990---- one conditionality is to increase exports) has to bear constraints of national status and has to pool in national kitty per se her economic muscle. Since 1990 the weak ecosystems of rangelands have been burdened with fruit farming against original crop habits of rangelands to increase the fruit exports. Consequently the water mining for fruit harvesting has suck the ground aquifers damaging the rangelands irreversibly.

Questionable binding force of environmental conventions: The three conventions were introduced, and signed, as the outcome of Rio Summit in 1992, namely:

1. United Nations Framework for Convention on Climate Change.
2. Convention on Biological Diversity.
3. Convention on desertification.

Despite these commitments the planet is still getting warmer and losing species at a rate higher than any time in its history_ an extinction that undermines future options. These outcomes occur because the absence of enforceable international regulatory and incentive systems. Individual countries are unable to capture the value of conservation and environmental protection measures that generate regional or global benefits. While the benefits of measures to reduce carbon dioxide (CO₂) emissions and protect genetic resources accrue to mankind, the costs of these measures have to be borne locally.



III. Rangeland Issues, livelihood and food security in Balochistan

According to the IPCC Report of Working Group 11 concerning the sensitivity, adaptive capacity, and vulnerability of natural and human systems to climate change and the potential consequences of climate change, following natural and human systems would be effected: -

1. Hydrology and water resources
2. Agriculture and Food Security
3. Human Health.
4. Human Settlements, Energy, and Industry
5. Terrestrial and Freshwater Ecosystems.
6. Coastal Zones and Marine Eco Systems.

To serve the concept of this paper only, Agriculture and Food Security (referred to rangelands) is incorporated in discussion.

To evaluate rangeland of Balochistan is befitting for food security in thee ways: one is that it is the source of sustainability for livestock (rangeland meets 90-95% of feed for a variety of livestock), second the livestock is a source of food, and third is financial benefit and status accrue due to the sale of livestock- this chain effects 80% livelihoods and the human settlements potentially in the province (AZRI, 2002).

Type and Potential of Rangelands in Balochistan: Balochistan is the only province in Pakistan whose most of the economy rests on rangelands. Out of the total area of 34.72 m ha of the province, only 4% (1.42 ha) is cultivated for agricultural crops while rest of the area is classified as rangelands. The rangelands located in north of the province are considered the best in grazing quality/ because of high rainfall. This region constitutes about 38% of the total area and carries 76% of total livestock in the province. Where as the rangelands in the south are considered as poor and covers 62% of the total area and carries only 24% of the livestock population (Ibid).

Crop and animal production systems: The farming systems integrate crop and livestock to produce foodstuffs for human and animal consumption. The animals can be sold to raise cash whenever it is needed. The income from sheep and goats as a percentage of farm income ranges from 40 to 70% for transhumants to 100% in the case of nomadic pastoralists. Off-farm income is becoming increasingly important as families fail to make a living from the land. It stabilizes the farm income, which is very susceptible to rainfall fluctuations.

Livestock systems vary, depending on the lifestyle of the animal owner and the rangeland property regime. Producers own 30 sheep and 22 goats on average. More than half (60%) of the small ruminants are found in flocks of up to 100 animals (PARC, 1999).

Transhumant flock owners can be landowner or land less. They practice agriculture by harvesting surface runoff and mainly grow winter wheat. Each winter they migrate with flocks to the low lands and go back to their homes in summer. Range production is also influenced greatly by the uncertainty of climate. The only option rests then is to migrate to areas where animal feed is relatively abundant.



Pastoral Communities in transition: The direct consequences of Active Afghan war and scattered landmines are the blockage of traditional transboundary migratory routes. The war has compelled the pastoralists, either to settle or rotate their flocks within the boundaries of Balochistan, who used to travel as far as the borders of Central Asian Republics and Russia. The other consequences of Afghan War are the influx of refugees in millions with their animals. These refugees in 1980's were camped away from the cities in rangelands. Human disturbances, like building of mud houses, harvesting of trees/shrubs for fuel wood, and continuous overgrazing of Afghan animals along with local flocks, converted a big area of Balochistan into barren land.

As soon as the international aid was stopped, the refugees moved out of camps and adapted migratory schedules on the lines of local nomads. These Afghan refugees have greatly built up pressure on ecological resources in Balochistan as well as have been key operators to induce shifts and changes in historically classified socio-economic systems of pastoralists in Balochistan.

Mainly the middleman harvests monetary return from sale of livestock and byproducts, and pastoralists are deprived of their profit. Subsidies, loans and other government incentives to the pastoralists are inadequate. This situation has created a feeling of isolation and disparity among these historical custodians of highland grazing grounds of the province.

Pastoral communities are undergoing through a remarkable change as a consequence of various socio-economic motivations and compulsions. These motivations and compulsions have probably encouraged the settlement of pastoralists, migration of landless farmers to urban areas for alternate employment opportunities. More importantly the breakdown or weakening of traditional pastoralist's decision-making mechanism has accelerated irreversible degradation of rangelands.

Ownership of rangeland: Only 4% of Balochistan territory was declared as management area of forest department. The rest was declared as the waste land by the British rulers, since then the northern Balochistan for forestry purposes is ruled by the Forest Regulation Act of 1890, and southern Balochistan by the Forest Act of 1927. Since the independence of Pakistan no legislation has been processed to deal with the rangeland. There is no institutional framework to govern and manage the rangelands.

In Balochistan rangelands are still seen as a source of livestock feed. The importance of rangelands as watershed, wildlife habitat, and recreation as aesthetics has been ignored. It is probably due to the fact that only a very small proportion of rangelands are under effective state control while the rest is owned or encroached by tribes or tribal chiefs. The statistics for the ownership of the land by the state and the private people is not available, Pakistan as a whole and Balochistan in particular lack adequate data and reporting procedures on rangelands and its utilization. In the absence of sufficient and reliable data, assumptions on which the projects are formulated are generally weak.



Institutional Constraints: There is lack of an appropriate range development institution. Natural resource management activities in Forest Department of Balochistan are highly forestry focused. Institutional neglect has been one of the major constraints in range development. There are no guidelines for rangeland development strategy and range use policy. Discontinuity in the provision of funds and community-will is a serious problem. Community based management is not being practiced in rangeland management and no proper mechanism exists to enlist community's will as an integrated approach. Forestry and livestock departments do not coordinate to implement their policies in respect of livestock and range land management.

As 96% land is far flung, the security issues arise when any plan is made for management. The official staff is threatened even to life for entering certain premises. That's the reason that if few projects are taken to implement they are near the main cities e.g., Participatory Upland Conservation Development in Kanak Valley is 50 km from Quetta- the details of this project are carried out in last leg of this paper.

On governance side there is lack of pilot projects to develop the rangelands. Due to political reasons they do not take rangeland, water, forest and wildlife as resources. So in the same culture of slackness towards rangelands the staff is not trained and they lack in capacity and above all they lack the will to do or to dedicate themselves for their official work.

Gender Issues in Rangeland degradation: The inadequate institutional frameworks that ignore women's role in decision-making. The women and children segment of the society is not properly informed about the range land issues as they are the users of range land. They fetch water and take the flocks for grazing- they can prove better protectors if their capacity is built so. There is lack of socio- economic analysis regarding the status of women in rangelands utility and protection, because of these reasons women lack sectoral and technical orientation to rangeland issues.

Psychological and cultural barriers: The analysis of rangeland situation from retrospect to perspective and prospective aspects reveal; that water and rangeland through the ages have been perceived a free commodity as it was available in abundance. Still psychologically people do not feel to protect the natural environment. Above all the range lands in management respect are reflected as the, "TRAGEDY OF COMMONS", for utility purpose every body forthrightly on the forefront but for management all is on the back front. In Balochistan every livestock holder earns thousands and hundreds of thousands by using the rangeland resources, but not ready to spend a single rupee to sustain the same range lands.

The other psychological phenomenon is that they might know about the rangeland degradation; but they do not realize the gravity of the issue, which reflects upon their action for betterment. In existing scenario of global climate change and demographic trends and above all the consumption patterns give a much shrunk view of existing natural resources, especially with reference to arid area like Balochistan.



It is the matter of social status that the tribal people want to have livestock of 100 heads as a social symbol, without caring the situation of rangeland. The local people have the eating habit of mutton at least once in a day- with increasing consciousness of status culturally prone to eat mutton is again a pressure on rangeland- there is social proverb in this respect- that even 'God will not refuse to eat mutton if he is offered'. Traditionally each relative member and friend is supposed to bring one sheep or goat on funeral ceremony. The author is eyewitness to one of such ceremonies- the people brought 86 sheep.

The Drought and Rangelands of Balochistan: A common worldwide assertion by users of rangeland is that droughts are more frequent and more severe than during previous generations. In contextual study of drought in Balochistan following points can be forwarded.

1. Balochistan up to 96% is comprised of rangelands.
2. At some points in Balochistan, the altitude level goes up to 8000 fts from sea level.
3. The whole of Balochistan is devoid of perennial rivers usually the river ways are filled with flash water floods.
4. The monsoon system is getting disturbed, because of global warming and it loses its strength for precipitation when it reaches the territory of Balochistan- as a result of increase in ocean temperature, and loss of western disturbances (comprised of Siberian cold winds).
5. The springs are vanishing, snowfall and precipitation is getting lower day by day, the groundwater is going down because of overuse.
6. The rangeland is losing compactness, due to drought and loss of vegetation, because of overpopulation of human beings and ruminants.

The erosion hazard during the drought is increased when prolonged grazing pressure has further reduced plant cover. The rangeland of Balochistan is being invaded by the existing desert of Chaghi and Kharan in south of the province (Rehman, 2002) as it is marching onwards.

The present drought spell is significant in following respects:

1. As it is proven according to IPCC, Working Group 1 Report the planet earth is getting warmer and its impacts would be more visible on vulnerable ecosystems of natural resources- the rangeland of Balochistan has less capacity and less adaptive to climate change conditions.
2. This drought has proven itself severe and extensive in its longevity and spatial reference because drought conditions persist in Afghanistan, Iran, and in other provinces of Pakistan sequenced as, Punjab, Sindh, and Sarhad.
3. War and poverty in Afghanistan has aggravated the drought and poverty conditions in the province of Balochistan.



IV. Adaptation Strategy to complement Climate Change Mitigation

This section assesses adaptation as necessary strategy at all scales to complement climate change mitigation.

Adaptation has the potential to reduce adverse impacts of climate change and to enhance beneficial impacts, but will incur costs and will not prevent all damages. Extremes, variability and rates of change are all key features in addressing vulnerability and adaptation to climate change. Human and natural systems will to some degree adapt autonomously to climate change. Planned adaptation can supplement autonomous adaptation, though options and incentives are greater for adaptation of human systems than for adaptations to protect natural resources.

Those with the Least Resources have the Least Capacity to Adapt are the most Vulnerable.

The ability of human systems to adapt to and cope with climate change depends on such factors as wealth, technology, education, information, skills, infrastructure, access to resources, and management capabilities. Populations and communities are highly variable in their endowments with these attributes, and the developing countries, particularly the least developed countries are generally poor in this regard.

Many countries and regions that are vulnerable to climate change are also under pressure from forces such as population growth, resource depletion, and poverty. Policies that lessen pressures on resources, improve management of environmental risks, and increase the welfare of the poorest members of society can simultaneously advance sustainable development and equity, enhance adaptive capacity, and reduce vulnerability to climate and other stresses. Appropriate management of land for crop, timber and sustainable bio-energy production, may increase benefits for climate change mitigation (IPCC Working Group 111 Report, 2001).

As the focus of this paper is rangeland and climate change in Balochistan, so in proceeding part the afforestation mitigation measures would be discussed.

Participatory Upland Conservation Development project 1992-1997: Participatory Upland Conservation Development project 1992-1997 is examined as an example to be followed locally while thinking globally.



This project for evaluation has been chosen because of following reasons:

- According to IPCC, Working Group 111 Report concerning climate change mitigation, there can be two options in this respect, one is to reduce emissions and the second is to increase carbon pools to reverse the two factors of human activity causing climate change, one is the production of emissions and the second is deforestation. As the concept of this paper is to reflect upon the rangeland of Balochistan in global perspective of climate change---it seems relevant to highlight some afforestation mitigation effort.
- This intervention to rehabilitate rangelands was projected with the aid of Food and Agriculture Organization of United Nations, sponsored by Italy, joined by the Soil Conservation Wing of Forest Department of Balochistan, and converged with the community participation. This replica of practice fits into the hierarchy of institutions picked for this dissertation purpose.
- This project has built the capacity of the community for natural resource management at persistent level, which can be replicated in other parts of the province also.

This project is a part of, "Inter-Regional Project for Participatory Upland Conservation and Development", (PUCD), funded by FAO and the Italian government. The project provided direct support to field initiatives in five countries, namely, Bolivia, Brundi, Nepal, Pakistan and Tunisia. The project aimed at promoting peoples participation in the conservation and development of upland catchments in accordance with governments policies and priorities. The Pakistan component of this project has been implemented in Kanak valley, Mastung District, 40km southwest of Quetta city, since 1992. The total area of Kanak valley is about 40,000 ha with an estimated population of 20,000 people living in 40 villages. The valley has arid subtropical continental climate, with low rainfall, low humidity, frequent winds, severe winters and mild summers. The mean annual precipitation is around 200mm. The counterpart institution is the Soil Conservation Wing of Balochistan Forest Department. The project promoted an integrated approach to watershed management.

Field initiatives agreed with local communities generally fall within three sectors of interventions as follows:

1. Range Rehabilitation.
2. Improvement of rain fed and irrigated farming systems.
3. Women's development activities as they can play an important role in the management of natural resources.

The objective of this program was to test and develop a methodology for rangeland rehabilitation based on land use planning with local communities. The idea was to define a practical, low cost and easily replicable rehabilitation package for local villages and the forest department. In the project area of Kanak Valley, rangelands are open for grazing without any restriction. In addition to the local population, nomadic herdsmen from the lowlands of Sibi and from Afghanistan use these areas during their annual migrations.



To address the land degradation problem the PUCD (Participatory Upland Conservation and Development) project launched a collaborative rangeland rehabilitation and management program, the Village Upland Use Plan. This program began by raising the community's awareness of the risks related to rangeland overexploitation and motivating the people to join the project in searching for technical measures that could contribute to a solution. To this end, staff and villagers organized a study tour to the rehabilitated and replanted demonstration areas established by the Arid Zone Research Institute in neighboring zones of Balochistan. The findings from this visit were disseminated throughout the project area through social communication campaign, which included video presentations, slide shows and thematic discussions.

Following these activities, interested village associations, in collaboration with project staff, prepared a rangeland management and re-vegetation plan. This plan, which was implemented with the assistance of FAO's Integrated Range and Livestock Development Project included:

- The use of participatory mapping to identify the existing pattern of rangeland resource use and the areas that according to local tenure arrangement could be used for collective management.
- The revitalization of the traditional social fencing practices: and
- The planting of drought-resistant indigenous and exotic species (e.g., saltbush, Atriplex, pistachio) to facilitate and speed up the natural re-vegetation process.

For four years, in six locations, the Village Upland Use Plan protected about 665 ha of rangeland. A total of 60,500 seedlings and cuttings were planted and watered during the dry season. Almost half survived. Data concerning production, the change in ground cover and the inventory of species were collected annually in collaboration with village associations through transect walks and from permanent sampling areas in the protected rangeland. Preliminary results indicated that a forward succession was taking place with the reestablishment of plant species, that had disappeared due to overuse and uprooting improvement in vegetation cover. As a result of this experience, Village Association members realized that highly degraded rangeland areas can become productive again, and their interest towards the program increased (Mori, 1997).

V. Conclusion

It is found during the course of study that the climate is global common. Commons management as Elinor Ostrom suggests; that successful commons are maintained (and are maintainable) neither by the state nor the market but by the local set of community feedbacks and adroitly turned to ensure the system's long-term health and prosperity. Ostrom's principles for sustainable management of local and regional commons include clear boundaries, locally appropriate rules, collective agreement, monitoring systems, graduated sanctions to punish infringements, conflicts resolution mechanisms, rights to organize and nested enterprises (Ostrom, 2000). Accordingly global community feedback climate has no boundaries, it has no appropriate rules; climate change agreements lack binding force, monitoring systems, of graduated sanctions to punish infringements, conflict resolution mechanisms.



Arresting global and regional environmental degradation therefore depends squarely on international cooperation. With the notable exception of the convention to phase out ozone depletion substances, progress in the implementation of these conventions and their resource protocols has been slow. The political, scientific, and technical complexities of the challenge are at the root of this failure. While the rich developed countries are responsible for the historical and current levels of greenhouse gas emissions, it is the poor, developing countries that are most vulnerable to the risks of climate change in terms of its impacts on agriculture, water resources and health.

The evidence suggests coordinated actions among countries, institutions and sectors may help to reduce mitigation cost, address competitiveness concerns and potential conflict with international trade rules.

Climate Change decision-making is essentially a sequential process under general uncertainty. A prudent risk management strategy requires a careful consideration of the consequences (both environmental and economic), their likelihood and society's attitude country and perhaps generation to coming generation. Due to this fact it is confirmed that the value of better information about climate change processes and impacts and society's responses to them is likely to be great.

It is found that at national level the climate change situation has not been well taken into account while negotiating to donor agencies, on permanent bases regarding future predictions plus the conventions on climate change, desertification, and biodiversity, which are signed by Pakistan. No potential steps have been taken to implement them- the reasons are political, economic and environmental crises being faced by the state particularly in 1990's simultaneously. In the absence of any social uplift and awareness plan, it is very difficult to develop a consensus among and between tribes to determine the degree of degradation to implement an improvement plan. Therefore, it is not surprising that rangelands are continuously degrading particularly in areas of heavy human activity. The fact is that no mechanism is available that allows effective coordination between existing set up and line departments. There is no single organization in the province that has mandate and capacity to deal with the multidimensional problems of rangelands.

PUCD project makes to realize that the "Tragedy of Commons" can be dealt at small community scale but seems difficult at provincial level, and blurs into impossibility when it goes to national and global levels.

As per relation of rangeland perspective of climate change, regional conflict in Afghanistan, and legislative lapses in management processes the existing trends are likely to continue in Balochistan.



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Endnotes

*1. *The Intergovernmental Panel on Climate Change* (IPCC) was jointly established by World Meteorological Organization and United Nations Environment Program in 1988 to assess the scientific and technical literature on climate change, the potential impacts of changes in climate, and options for adaptation to mitigation of climate change.

*2. *Raioactive forcing* is a measure of influence- a factor in altering the balance of incoming and outgoing energy in the Earth-atmosphere system, and is an index of the importance of the factor as potential climate change mechanism.



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AN INVESTIGATION ON OUTDOOR NOISE LEVELS IN THE TUZLA SHIPYARDS REGION IN ISTANBUL

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Noise nuisance grown out of the shipyards depends on the different sources such as scraping, shot blasting, mill scale and cutting in the shipbuilding industry. Outdoor noise levels differ from one source to another between 45 dBA to 115 dBA (L_{Aeq}). Noise existence time in the area is not stable. It shows fluctuation between 0.5 min and 7 hours in accordance with the type of the source sort. Therefore, daily mean noise levels were measured and evaluated. In this study, outdoor noise levels measurements were performed in accordance with the Turkish Standards Institute. All the noise level measurements were performed by using Sound Level Meter HD 9018 equipment. The main purposes of the study were classified as two parts. One of them was to determine the noise sources of the shipyards and its places by GPSMap76CS in Tuzla and the other one was to come out or monitoring of changing of noise levels easily at the same points in the future.

Key Words: *GPS, noise control regulation, outdoor noise level measurement, shipyard, Istanbul*

1. INTRODUCTION

Noise produced by Industry affects people in two main ways. Noise causes annoyance to neighbours, particularly in mixed residential/industrial areas, and it causes actual damage to hearing of workers due to over-exposure at the workplace (Noise Control in Industry, 1991). Shipbuilding industry has displayed activity for six hundred years, in Turkey. So, lots of shipyards have been founded for the period at that time. There are a lot of shipyards in Turkey at present. 39 of them are in the Tuzla shipyards region located at eastern of Istanbul. Tuzla Shipyard Region has total of a-6300 m length dock and 25000 m² covered area. There are 12 floating docks with lifting capacity ranging between 2700 ton and 100000 ton and floating cranes with lifting capacity up to 2000 ton.

Noise nuisance grown out of the shipyards depends on the different sources such as scraping, shot blasting, mill scale and cutting in the shipbuilding industry. Outdoor noise levels differ from one source to another between 45 dBA to 115 dBA (L_{Aeq}). Noise existence time in the area is not stable. It shows fluctuation between 0.5 min and 7 hours in accordance with the type of the source sort. Therefore, daily mean noise levels were measured and evaluated.

The main purposes of the study were classified as two parts. One of them was to determine the noise sources of the shipyards. The places of the noise sources were determined by GPSMap76CS apparatus in the region. The other one was to come out or monitor of changing of noise levels easily at the same points in the future.



2. THE FABRICATION PROCESS AND SOURCES OF NOISE IN THE SHIPYARDS

2.1. The fabrication process in the shipyards

In the region of Tuzla integrated industrial shipyards, it is done shipyards care and instruction. A production schema of shipyards was given Figure 1.

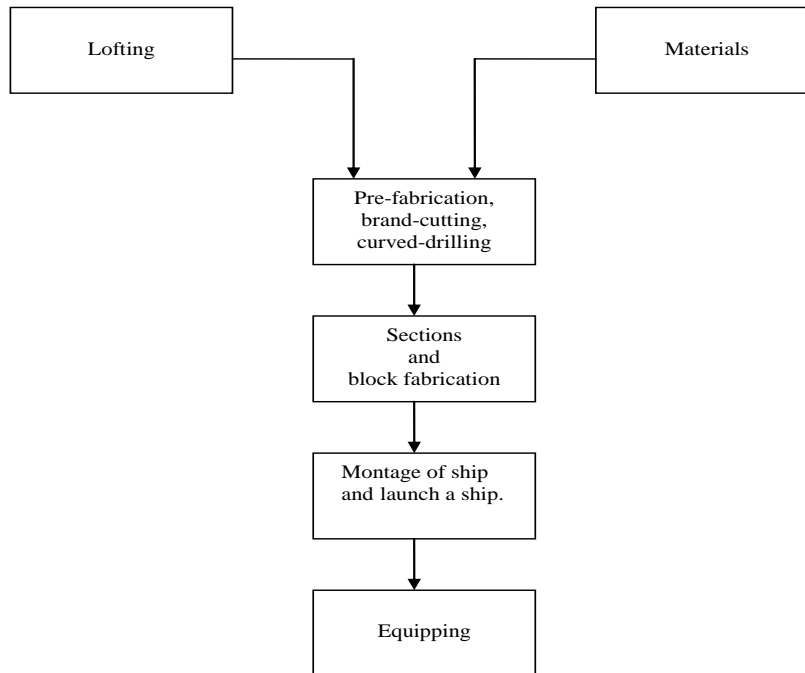
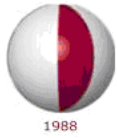


Figure 1 A production schema of shipyards

A shipyard contains a lot of units such as design, administrative, and management (Rumelioğlu, 1989). Some of them were explained in that section.

Lofting: a production of new ship starts in the lofting unit. New ship projects designed are sent to the lofting unit. The certificates of the projects are generally: the length cross section picture of the ship, off set table of the ship, preparing of the lofting with conventional and full scale, drawing of optical brand and cutting illustrations, works for CAD based fabrication.

Pre-fabrication: Sheet iron and profile brought to shipyard are tacked orderly. Dimensions of tacking area in shipyards are related in production capacity, tacking methods (perpendicular, horizontal), dimensions and numbers of sheet iron. The amount of sheet iron required for ship fabrication per year implies the capacity of production (fabrication). The cranes are used in order to lift up and to carry materials stacked orderly. Hence, the transportation time is decreased. After that, sheet iron and profile are prepared for fabrication. Preparation for fabrication of sheet irons and profiles take into account a lot of sections such as sheet irons and profiles pass over cylinder, cleaning process by scraping, shot blasting. Furthermore, sheet irons and profiles applied shot blasting process are worked up by prefabrication process before they send to the fabrication. In this section, the processes of the brand, cutting, curved and drilling are frequently applied.



Fabrication of sections and blocks: in the shipyard, the fabrication comes after to be practice of materials formed ship. The fabrication process is connection of ship material by welding. Montage of ship on the sledge: The montage sledge selection of the shipyard is based on several factors such as operating cost, investment cost. It is determined the montage sledge type based on the effects of the factors. Hence, launching a ship is related in sledge type.

2.2 The noise sources related in shipyards

The mean values of some noise sources were given in Table 2 (Özay, 1997).

Sources of noise	L_{Aeq} (dBA)
Speaking (normal)	50
The room of stenograph	75
Lathe, grinder, driving wheel, counter	95
Compressor, drilling machine	100
Milling machine, planning machine	115
Drill, drop hammer	125
Shotgun, turbine	145

Table 2 The mean values of some noise sources

According to the Table, mean noise level of speaking is given as 50 dBA, mean noise level of stenograph room can be give as 75 dBA. Moreover, mean value of lathe, grinder, driving wheel and counter can be given as 95 dBA. Features of the shipyards measured outdoor noise level are given in Table 3.

Shipyards	Total Area, m ²	The Number of Workers	Total Capacity, Ton Steel / Year	Shipyards	Total Area, m ²	The Number of Workers	Total Capacity, Ton Steel / Year
T1	39575	342	10616	T14	5151	67	7500
T2	5546	68	5364	T15	14722	43	21286
T3	15444	49	11775	T16	19640	176	16045
T4	5965	253	9442	T17	40438	137	66437
T5	40000	43	7021	T18	3763	30	5855
T6	19403	174	13449	T19	44000	47	73333
T7	2500	56	6642	T20	17600	28	-
T8	25062	270	-	T21	300	56	2205
T9	5926	65	3660	T22	15853	226	29088
T10	4493	25	4334	T23	13915	170	19191
T11	17085	47	16300	T24	40000	84	5797
T12	129287	356	19143	T25	5455	52	-
T13	20400	300	33167	-	-	-	-

Table 3 Some properties of the shipyards done the measurement of outdoor noise level in Tuzla Shipyards Region



2.3 Turkish noise legislation related in shipyards

In Turkey, standard regulations dealing with shipyards exist. According to Turkish Noise Control Regulation, shipyards have to respect Appendix VII (List B, caption: 2). In the Regulation, the section about shipyard exists also in Matter 25 in Table 4, and contains environmental limit values for industrial regions. According to Turkish Noise Control Regulation, outdoor noise level from shipyards, maximum available value of daily mean noise levels have to be below 60 dBA (L_{Aeq}) at night and 70 dBA (L_{Aeq}) in the day time (TR Ministry of Environmental and Forest, 2002). The table related in the regulation of environmental noise pollution and management is given in Table 4.

Properties of industrial regions	L_{day} (dBA)	L_{night} (dBA)
Integrated industrial regions	70	60
Industrial and dwelling regions (most of them is Industrial area)	68	58
Industrial and dwelling regions (most of them is dwelling area)	65	55
Rural and dwelling area	60	50

Table 4 The regulation of environmental noise pollution and management on industrial regions (TR Ministry of Environmental and Forest 2002, Table 4)

3. MATERIAL and METHOD

The noise data were measured as the time-averaged level (L_{Aeq}) by using the sound level meter at a 1000 Hz central octave band. The methods of the measurement and properties of apparatus is given in Table 5.

Apparatus	Parameter	Process	The method of the measurement
Sound level meter, HD9018 Delta Ohm	Sound pressure level; L_{Aeq} , L_{max} , L_{min}	The measurement of sound waves by microphone	TS 10713:1993 TS 10792:1993 TS 9315:1991 TS 10750:1993 TS 2214:1993 TS 2710:1977

Table 5 The methods of the measurement and properties of apparatus

Outdoor noise level measurements were done in 25 shipyards located in the Tuzla shipyards region in Istanbul. Outdoor noise level measurements were performed in accordance with Turkish Standard Institute. All the noise level measurements were performed by using Sound Level Meter HD 9018 equipment. The microphone height from the ground and distance from the source of the equipment were 1.5 m and 1 m, respectively. Measurement points are determined by using GPSMap76CS apparatus and noise data are stored the apparatus database.



4. RESULTS and DISCUSSION

Tuzla shipyard region has total of a-6300 m length dock and 25000 m² covered area. There are 12 floating docks with lifting capacity ranging between 2700 ton and 100000 ton and floating cranes with lifting capacity up to 2000 ton.

In this study, outdoor noise levels measurements were performed in accordance with the Turkish Standards Institute. All the noise level measurements were performed by using Sound Level Meter HD 9018 equipment. The microphone height from the ground and distance from the source of the equipment were 1.5 m and 1 m, respectively. Measurement points are determined by using GPSMap76CS apparatus and noise data are stored the apparatus database.

According to Turkish Noise Control Regulation, maximum available value of daily mean noise levels have to be below 60 dBA (L_{Aeq}) at night and 70 dBA (L_{Aeq}) in the day time. According to results, outdoor noise nuisance were changed depend on the different sources such as scraping, shot blasting, mill scale and cutting in the shipbuilding industry. Outdoor noise levels differ from one source to another between 45 dBA to 115 dBA (L_{Aeq}). Noise existence time in the area is not stable. Noise existence time showed fluctuation between 0.5 min and 7 hour in accordance with the type of the source sort. Maps with node done noise level measurement were given in Figure 2. Moreover, the results of the momentary and mean noise levels measurements existed the maps were given in Figure 3-6.

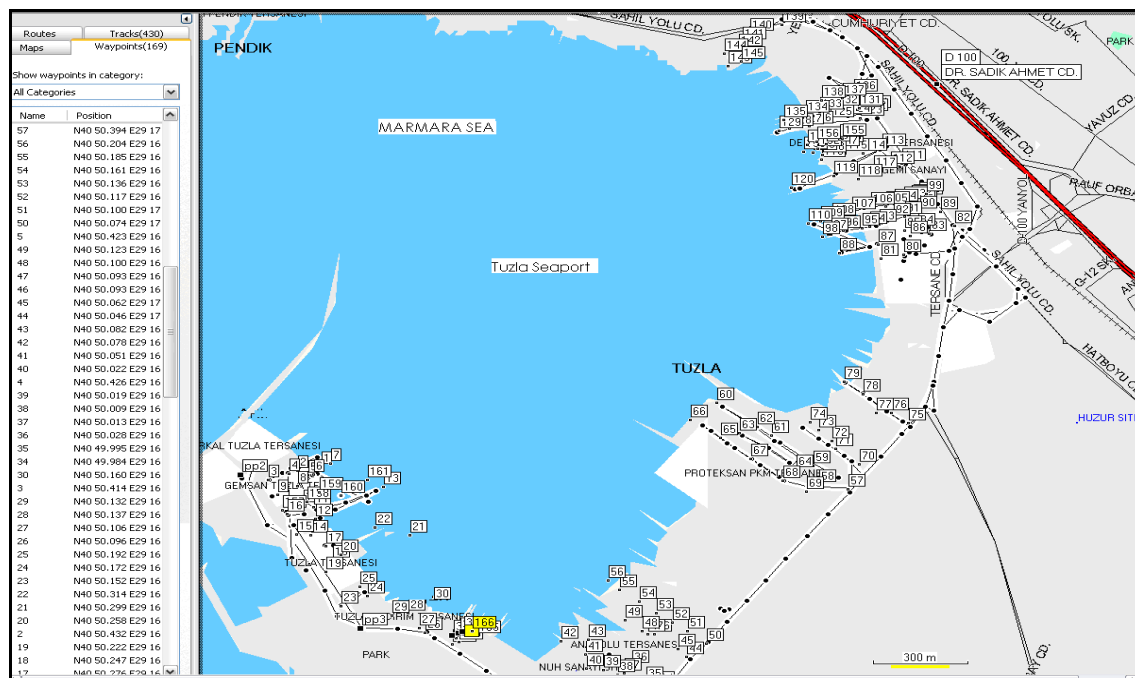


Figure 2 The map of noise level measurement points

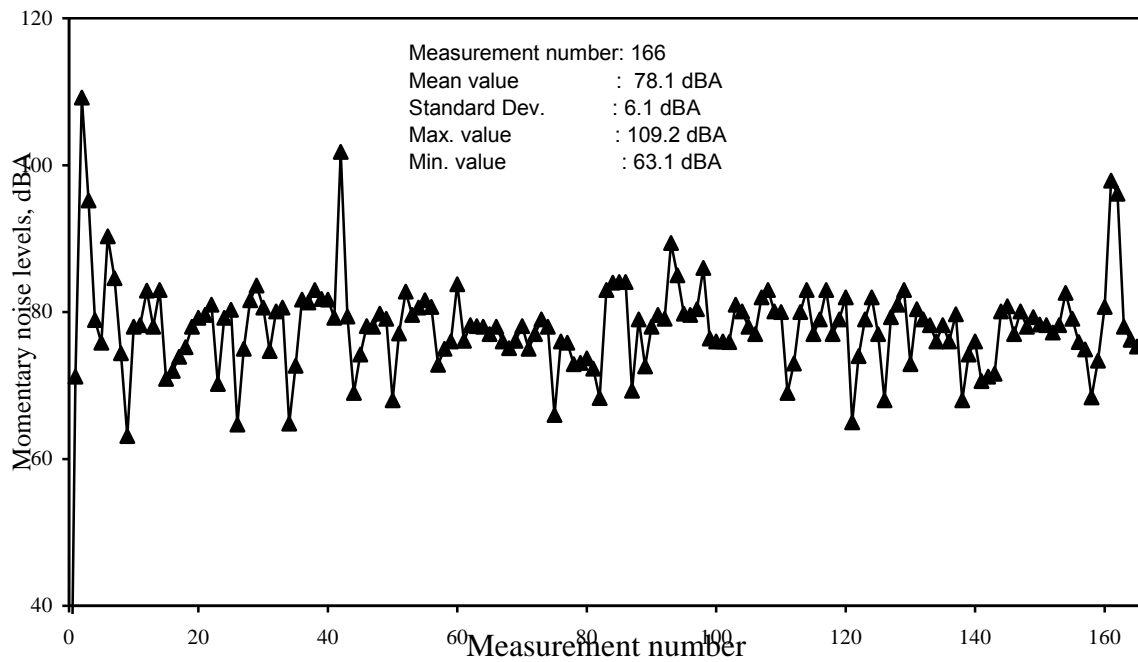


Figure 3 Momentary noise levels measured in Tuzla Shipyards Region

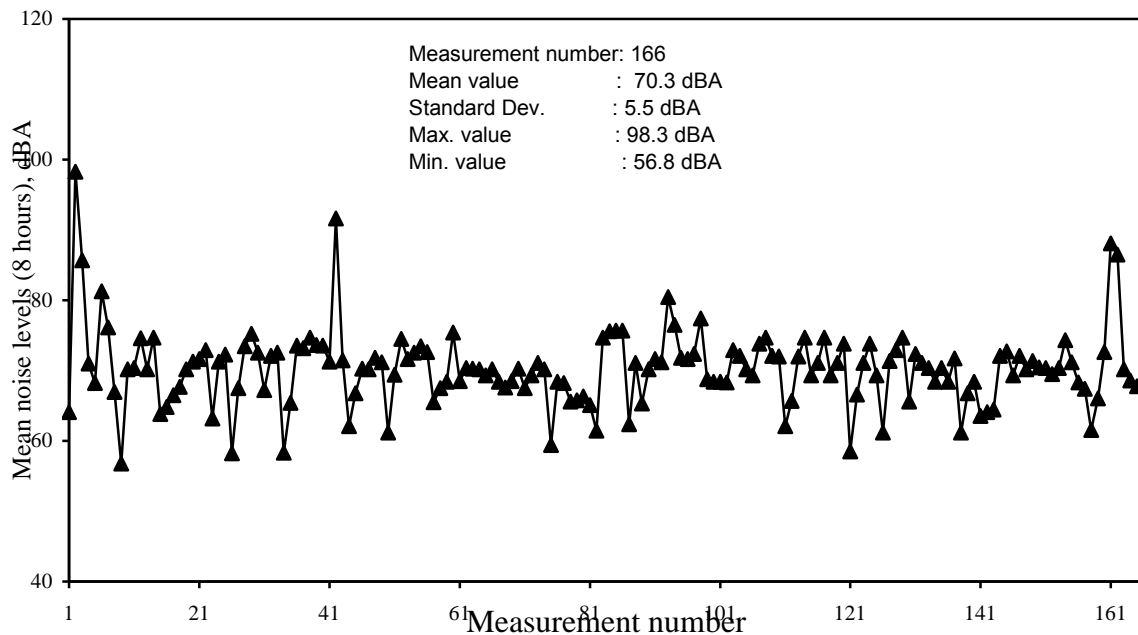


Figure 4 Mean noise levels (8 hours) measured in Tuzla Shipyards Region

According to Figure 3; the number of the measurements, the mean of the measurements, the standard deviation of the measurements, the maximum and the minimum value of the measurements were obtained as 166, 78.1 dBA, 6.1 dBA, 109.2 dBA, and 63.1 dBA, respectively. According to Figure 4; the number of the measurements, the mean of the measurements, the standard deviation of the measurements, the max value of the measurements and the min value of the measurements were obtained as 166, 70.3 dBA, 5.5 dBA, 98.3 dBA, and 56.8 dBA, respectively.

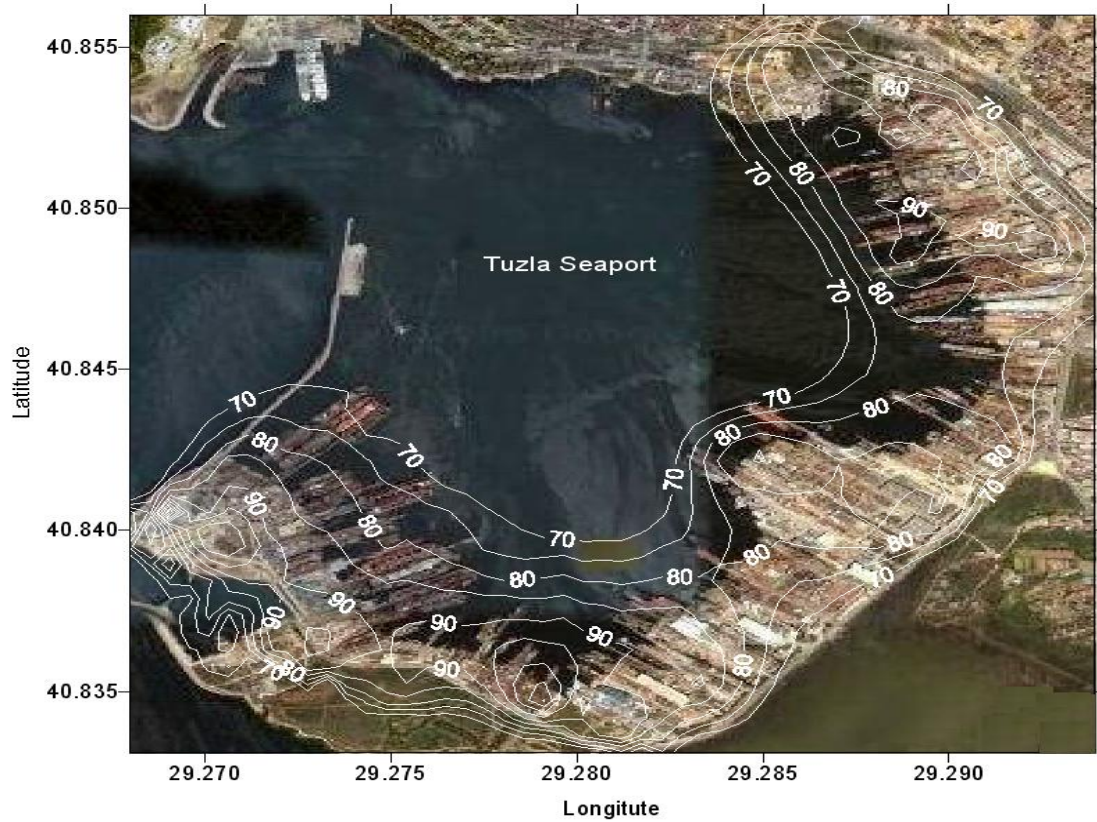


Figure 5 The counter map of momentary noise levels measured in Tuzla Shipyards Region

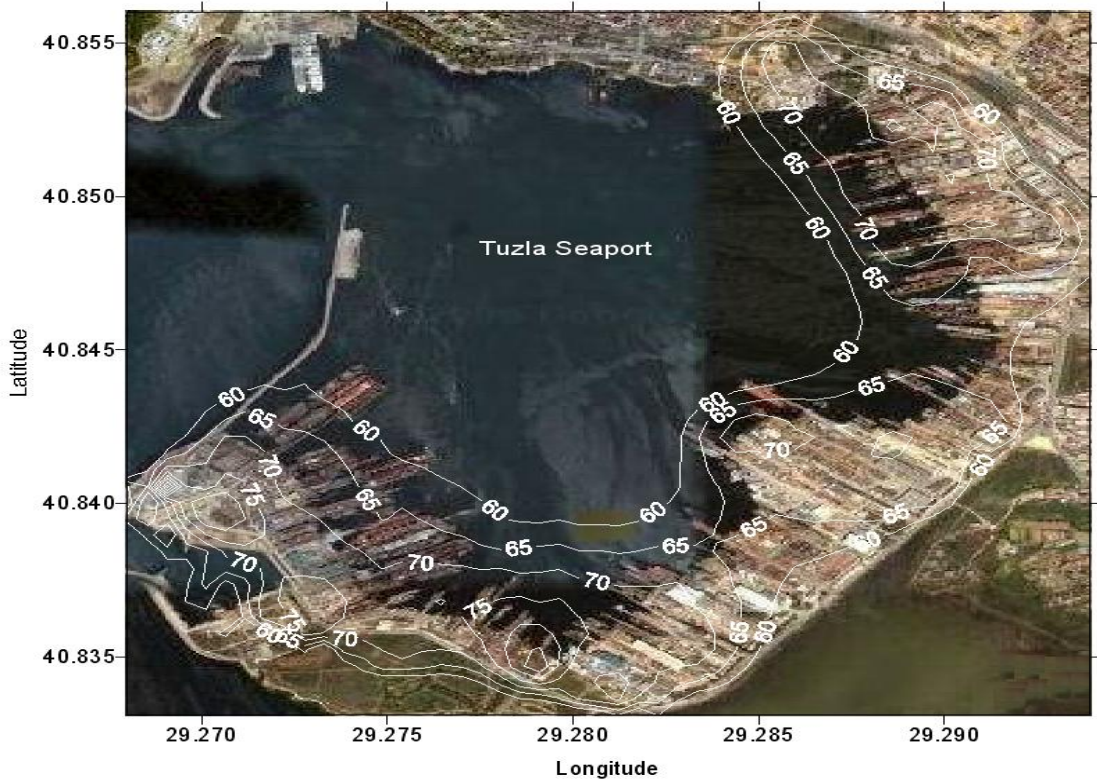


Figure 6 The counter map of mean noise levels (8 hours) measured in Tuzla Shipyards Region



5. CONCLUSION

In this study, outdoor noise levels measurements were performed in accordance with the Turkish Standards Institute. All the noise level measurements were performed by using Sound Level Meter HD 9018 equipment. The microphone height from the ground and distance from the source of the equipment were 1.5 m and 1 m, respectively. Measurement points are determined by using GPSMap76CS apparatus and noise data are stored the apparatus database.

According to Turkish Noise Control Regulation, maximum available value of daily mean noise levels have to be below 60 dBA (L_{Aeq}) at night and 70 dBA (L_{Aeq}) in the day time. According to results, although momentary noise levels were higher than the standards values, daily mean noise levels were generally determined below the related standard values.

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DETERMINANTS OF AGRICULTURAL INTENSIFICATION IN SOUTHWEST NIGERIA

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Declining agricultural production on some tropical farmland has prompted increased use of some inputs while continuous cropping prevails. This study analyzed the factors promoting different forms of agricultural intensification in southwestern Nigeria. Data collected from randomly selected farmers in selected states in southwestern Nigeria were used. Results show that farmers from Osun State have the highest indices of intensification with respect to land use intensity, fertilizer use intensity and crop diversification. The censored regression showed that lost working days, use of fertilizers, crop rotation, and having more inherited land increased land use intensity while use of organic manure, minimum tillage and poverty reduced crop diversification index. Fertilizer use intensity increased with the use of minimum tillage and household size while hired and family labour use intensity increased with household size. It was recommended that in the face of increasing land degradation, farmers' access to fertilizer must be increased and effort to reduce their poverty level must be promoted, among others.

Keyword: *poverty, agricultural intensification, land degradation, censored regression*

Introduction

The use of land for agricultural production remains one of the strongest influences affecting environmental quality in many developing countries. Practices like unguided application of agrochemicals, bush burning and mechanized land cultivation affect the quality of soil and vegetative covers (Scherr, 1999). Policymakers are now confronted with the challenges of increasing agricultural production to stimulate economic growth and reduce poverty, while the issue of natural resource degradation requires an urgent attention (Vosti, 1992; Vosti, 2001).

Conventionally, intensive agricultural production can be expressed as increase in the use of inputs of labour or capital on a smallholding, in order to increase output per hectare (Tiffen *et al.*, 1994). Alternatively, agricultural intensification can be defined as an increase in agricultural production per unit input of labour, land, time, fertilizer, seed, feed, or cash (FAO, 2004). Boserup's "induced innovation" concept asserts that increasing population stimulates increasing demand for agricultural products (Boserup, 1965). As land therefore becomes more costly compared to labour, incentives emerge for more intensive use of land in order to reap the benefits of the enlarged market opportunities. Similarly, Cleaver and Schreiber (1994) hypothesized the "downward spiral concept". This states that poverty, over population, and land degradation create a self reinforcing nexus that further promote degradation of natural resources and poverty. This is because the process of soil mining in the form of agricultural intensification triggers soil erosion and results into decline in land productivity (Scherr, 1999).



The downward-spiral and induced innovation scenarios have been found under different situations (Pender, 1998). Cases of the downward spiral were described by Durning (1989), Lopez (1998) and Ram *et al*, (1999), while induced innovation had been reported by Leach and Mearns (1996), Mortimore and Adams (1999), Templeton and Scherr (1999), Tiffen (2002) and Tiffen and Mortimore (2002). A comparison of the downward spiral and induced innovation revealed that outcome is largely dependent on how well a society adapts to rapid population growth, globalization, market development, technological change, climatic change, and agro-ecological conditions (Lele and Stone, 1989; Kuyvenhoven and Ruben, 2002). Forsyth *et al* (1998) showed that poor people increasingly exploit natural resources as a result of population growth, limited access to land, access to marginal land of low productivity and limited resources for investment. This situation led to lack of resources for sustainable resource management and declining food production. Several authors have also noted that decline in wages and unemployment among the poor can result into increased land clearing and deforestation (Grepperud, 1996; Mink, 1993; Kumar and Hotchkiss, 1988; Casey and Paolisso, 1996).

Bourn and Wint (1994) noted that in SSA, livestock biomass increases with rising levels of human population and increasing intensity of land use. It was stressed that the findings are consistent with expectations of the “Boserup hypothesis”, and reflect the process of ‘autonomous intensification’ of agricultural production (Boserup, 1965, 1980, 1981), through initial co-existence and gradual integration of animal husbandry within local farming systems.

Osemeobo (1993) evaluated the land use pattern of smallholders for cassava production in Southern Nigeria. He found that the users’ rights on land, farm yield and access to farmland all influenced land-use intensity. Okike *et al* (2001) determined the factors influencing agricultural intensification in the northern part of Nigeria. The results showed that land use intensity was largely influenced by land-man ratio, herd size, rate of application of manure and fertilizers, crop labour and years of experience in mixed farming. Also, land use intensity increased as land human population ratio increased but decreased at very high land human population ratio due to possibility of labour shortages. Also, increased fertilizers application led to increase in labour use intensity, but the reverse was the case for manure application per hectare.

Randrianarisoa and Minten (2001) found that in Madagascar, poorer households had low labour productivity, but their return to land was high. It was recommended that much economic gains would result if poor farmers have access to fertile land. Also, the analysis revealed that sound education, which the poor do always have influenced agricultural production. While the poor depend on upland crops, diversification into high value crops by the rich enhances economic welfare. This paper attempts to determine the factors influencing agricultural intensification in southwest Nigeria. The specific objectives are to compute some indicators of agricultural intensification and describe them, and analyze the effect of some socio-economic and cultural factors on the indicators of intensification.



Materials and methods

The data

Data for the study were collected from Oyo, Osun and Ekiti states in the southwestern part of Nigeria. The states enjoy tropical climate with two distinct seasons – rainy season from April to October and dry season from November to March. The traditional practice of slash and burn agriculture predominates, and this is expected to be followed by a period of fallow for the soil to regain the lost fertility.

The multistage random sampling procedure was used. The first stage involved random selection of 3 states from the southwest Nigeria. At the second stage, 2 Local Government Areas (LGAs) were randomly selected from each of the chosen states. The third stage involved the random selection of 3 villages from each of the selected LGAs, from where households were selected for interview. A total of 350 questionnaires were administered based on available cost and time. Samples were selected in proportion to the estimated population of farmers in the villages.

In Oyo State, the selected LGAs were Akinyele and Lagelu. A total of 120 questionnaires were administered out of which only 100 were good for inclusion in the final analysis. In Ekiti State, a total of 110 were administered to farmers in Ikole, and Ado Ekiti LGAs. Out of the questionnaires administered, only 100 were good for inclusion in the final analysis. In Osun State, a total of 120 questionnaires were administered in Obokun and Ife Central LGAs. Out of the administered questionnaires, 103 were good for inclusion in the final analysis. The rejected questionnaires contained insufficient information.

Analytical procedures

In order to analyze the socio-economic/cultural factors explaining some indicators of agricultural intensification, a censored Tobit regression analysis of covariance (ANCOV) was used (Okike *et al*, 2001). The estimated models are stated below:

$$LUI_i = \beta_1 + \beta_2 EXP_i + \beta_3 DBB_i + \beta_4 DMC_i + \beta_5 DOM_i + \beta_6 DCC_i + \beta_7 EDC_i + \beta_8 SZE_i + \beta_9 DZTi + \beta_{10} FCI_i + \beta_{11} FCB_i + \beta_{12} FCP_i + \beta_{13} MKD_i + \beta_{14} POV_i + \beta_{15} LWD_i + \beta_{16} DFT_i + e_i$$

..... 1

$$CDI_i = \phi_1 + \phi_2 EXP_i + \phi_3 DBB_i + \phi_4 DMC_i + \phi_5 DOM_i + \phi_6 DCC_i + \phi_7 EDC_i + \phi_8 SZE_i + \phi_9 DZTi + \phi_{10} FCI_i + \phi_{11} FCB_i + \phi_{12} FCP_i + \phi_{13} MKD_i + \phi_{14} POV_i + \phi_{15} LWD_i + \phi_{16} DFT_i + f_i$$

..... 2

$$FUI_i = \sigma_1 + \sigma_2 EXP_i + \sigma_3 DBB_i + \sigma_4 DMC_i + \sigma_5 DOM_i + \sigma_6 DCC_i + \sigma_7 EDC_i + \sigma_8 SZE_i + \sigma_9 DZTi + \sigma_{10} FCI_i + \sigma_{11} FCB_i + \sigma_{12} FCP_i + \sigma_{13} MKD_i + \sigma_{14} POV_i + \sigma_{15} LWD_i + g_i$$

..... 3

$$FLI_i = \rho_1 + \rho_2 EXP_i + \rho_3 DBB_i + \rho_4 DMC_i + \rho_5 DOM_i + \rho_6 DCC_i + \rho_7 EDC_i + \rho_8 SZE_i + \rho_9 DZTi + \rho_{10} FCI_i + \rho_{11} FCB_i + \rho_{12} FCP_i + \rho_{13} MKD_i + \rho_{14} POV_i + \rho_{15} LWD_i + \rho_{16} DFT_i + h_i$$

..... 4

$$HLI_i = \rho_1 + \rho_2 EXP_i + \rho_3 DBB_i + \rho_4 DMC_i + \rho_5 DOM_i + \rho_6 DCC_i + \rho_7 EDC_i + \rho_8 SZE_i + \rho_9 DZTi + \rho_{10} FCI_i + \rho_{11} FCB_i + \rho_{12} FCP_i + \rho_{13} MKD_i + \rho_{14} POV_i + \rho_{15} LWD_i + \rho_{16} DFT_i + k_i$$

..... 4

Where β_s , ϕ_s , σ_s , ρ_s are the estimated parameters ($s = 0 \dots 16$) and i refers to individual farmers ($i = 1 \dots 303$)



LUI_i = land use intensity of i th farmer measured by the modified Rutherberg's index (Rutherberg, 1980) $LUI_i = A_i / L_i$ with A_i = Number of seasons the land was cultivated by i th farmer, L_i = Total number of seasons land would have been cultivated if under continuous cropping.

CDI_i = crop diversification index measured by the Herfindal Index which is $\sum_{i=1}^{13} \left(\frac{C_i}{\sum_{i=1}^{13} C_i} \right)^2$ with

C_i being the area of land planted to i th crop.

FUI_i = fertilizer use intensity [fertilizer applied (kg)/land area sq meter]

FLI_i = family labour use intensity (number of family labour (man day)/land area (ha)

HLI = hired labour use intensity (number of family labour (man day)/land area (ha)

LWD_i = lost working days due to sickness

EXP_i = years of farming experience

SZE_i = household size

POV_i = poverty rate {poverty line (2/3 mean per capita expenditure of the population)/mean per capita expenditure of i th household}(Foster et al, 1984).

LAF_i = land area fallowing (ha)

FCI_i = food cropland areas inherited (ha)

FCB_i = food cropland areas borrowed (ha)

FCP_i = food cropland areas purchased (ha)

DCR_i = dummy variable for using crop rotation (yes = 1, otherwise= 0)

DFT_i = dummy variable for using fertilizers (yes = 1, otherwise = 0)

DCC_i = dummy variable for using cover crops (yes = 1, otherwise = 0)

DBB_i = dummy for bush burning (yes = 1, 0 otherwise)

DED_i = dummy for education (formal education = 1, otherwise= 0)

DMC_i = dummy for using mulching (Yes = 1, otherwise = 0)

DOM_i = dummy for using organic manure (Yes = 1, otherwise= 0)

DZT_i = dummy for using zero tillage (Yes = 1, otherwise = 0)

e_i, f_i, g_i, h_i, k_i = residual/error terms

Results and Discussions

The results in table 1 shows that 91.75 percent of the house heads in all the States are male. Average age highest in Ekiti State with 54.17 years, while all the farmers have an average of 52.83 years. In like manner, average farming experience is highest in Ekiti State with 31.17 years while farmers from all the states have an average of 28.75 years. Ekiti State records the highest average household size of 7.19 persons, while Osun State records the highest percentage of 57.28 being formally educated.

The upper segment of table 2 shows the indices of agricultural intensification. Results show that land use intensity is highest in Osun State with 95.43 percent, while Ekiti State has the lowest (51.20 percent). The 3 States have an average land use intensity of 71.09 percent. This shows that continuous cropping is most predominant among farmers from Osun State. The distribution of the land use intensification indices is presented in figure 1.



Variable	Oyo State	Ekiti State	Osun State	All States
Total number of households	100	100	103	303
Male farmers (%)	96.00	92.00	87.37	91.75
Age of house head (mean)	50.22	54.17	54.06	52.83
Years of farming (mean)	26.69	31.17	28.42	28.75
Household size (mean)	6.68	7.19	6.74	6.87
Formal education (%)	52.00	57.00	57.28	55.44

Table 1: Some Socio-economic Variables of the Farm Households in Southwestern Nigeria

Variable	Oyo State	Ekiti State	Osun State	All States
<i>Index of Intensification</i>				
Land use intensity (mean)	65.90	51.20	95.43	71.09
Crop Diversification (Mean)	18.48	43.19	68.19	43.53
Fertilizer use intensity (kg/sq meter)	0.0070	0.0056	0.0092	0.0073
Labour use intensity (family) (man day per hectare)	31.22	31.90	27.03	29.75
Labour use intensity (hired) (man day per hectare)	16.94	18.15	26.19	20.23
<i>Usage of land management/cultural practices (%)</i>				
Mulching	62.00	42.00	71.84	58.74
Crop rotation	64.00	48.00	88.35	66.99
Organic manure	30.00	29.00	14.56	24.42
Fertilizer application	69.00	47.00	82.52	66.34
Cover crop	25.00	29.00	24.27	26.07
Bush burning	70.00	73.00	79.61	74.26

Table 2: Agricultural Intensification Indices and Use of Some Cultural Practices in Southwestern Nigeria.

Also, using crop diversification as index of agricultural intensification, the indices were computed. The crops planted were maize, tomatoes, leafy vegetables, okro, melon, cassava, cocoyam, plantain/banana, pepper, soybean, yam and cowpea. Farmers from Osun State have the highest output diversification index of 68.19 percent, while Oyo State has the lowest (18.48 percent). Average output diversification for the 3 States is 43.53 percent.

Intensity of fertilizer use is another form of agricultural intensification. The analysis reveals that Osun State farmers have the highest (0.0092), while Ekiti State has the lowest (0.0056). It can be deduced that allowance for fallowing as shown by land use intensity decreases where fertilizer usage is high. Intensity of fertilizer use is an average of 0.0073 kg/m² for all the 3 States.



Farmers from Ekiti State have the highest family labour use intensity (31.90 man-day per hectare), while those from Osun State have the lowest (27.03 man day per hectare). However, Osun States farmers have the highest hired labour use intensity (26.19 man-day per hectare), while Oyo State farmers have the lowest (16.94 man-day per hectare).

The lower segment of table 2 shows the use of land management practices, which indirectly depict intensification. The results show that 71.84 percent (highest) of the farmers in Osun State were using mulching, while 42 percent (lowest) used it in Ekiti State. Also, 88.35 percent (highest) of the farmers in Osun State were using crop rotation, while 48 percent (lowest) used it is Ekiti State. The use of organic manure is highest in Oyo State (30 percent) and lowest in Osun State (14.56 percent). Fertilizers were being applied by 82.52 percent of the farmers in Osun State, while only 47 percent use it in Ekiti State. Bush burning was most widely used in Osun State (79.61 percent), while cover crops were most widely planted in Ekiti State (29 percent).

Table 3 shows the results of Tobit maximum likelihood estimates for the determinants of agricultural intensification (estimated with Limdep 7.0 statistical package). The sigma values for all the equations are statistically significant ($p < 0.01$). This shows that the model produced good fit for the data. The Condition Index was estimated with SPSS 10.0 statistical package in order to determine the collinear variables. However, age as a variable was removed due to its high level of collinearity with farming experience. The low values for the estimated condition index reveals that multicollinearity was not a problem in the estimated models.

The estimated parameters show that the farmers that were using slash and burn method of land preparation have significantly higher labour use intensity ($p < 0.10$). This might have resulted from employment of many family hands for such menial job of bush gathering, stumping and burning. The practice of mulching requires significantly higher use of hired labour ($p < 0.01$). This might be due to the fact that farmers that indicated mulching were those planting yam which requires ridge making. The tediousness of ridging may therefore make them employ more of hired labour. Also, the use crop rotation significantly increases land use intensity ($p < 0.01$). This can be explained from the fact that rotating crops enhances productivity of land and this may facilitate continuous cropping. Also, the use of organic manure significantly reduces land use intensity and crop diversification ($p < 0.10$).

Those farmers that were planting cover crops have significantly higher family and hired labour use intensity ($p < 0.10$). The parameter of family labour use intensity is higher showing that farm plots planted with cover crops use higher family labour. This is expected because when farmlands are grown with cover crops like melon, much care is needed during weeding, and hired labour may not exercise the needed patience. As expected, those using fertilizer have significantly higher land use intensity ($p < 0.01$). Therefore, as land nutrient diminishes due to continuous cropping, the farmers have imbibed the habit of applying fertilizers. Hypothesis 1 is hereby rejected.

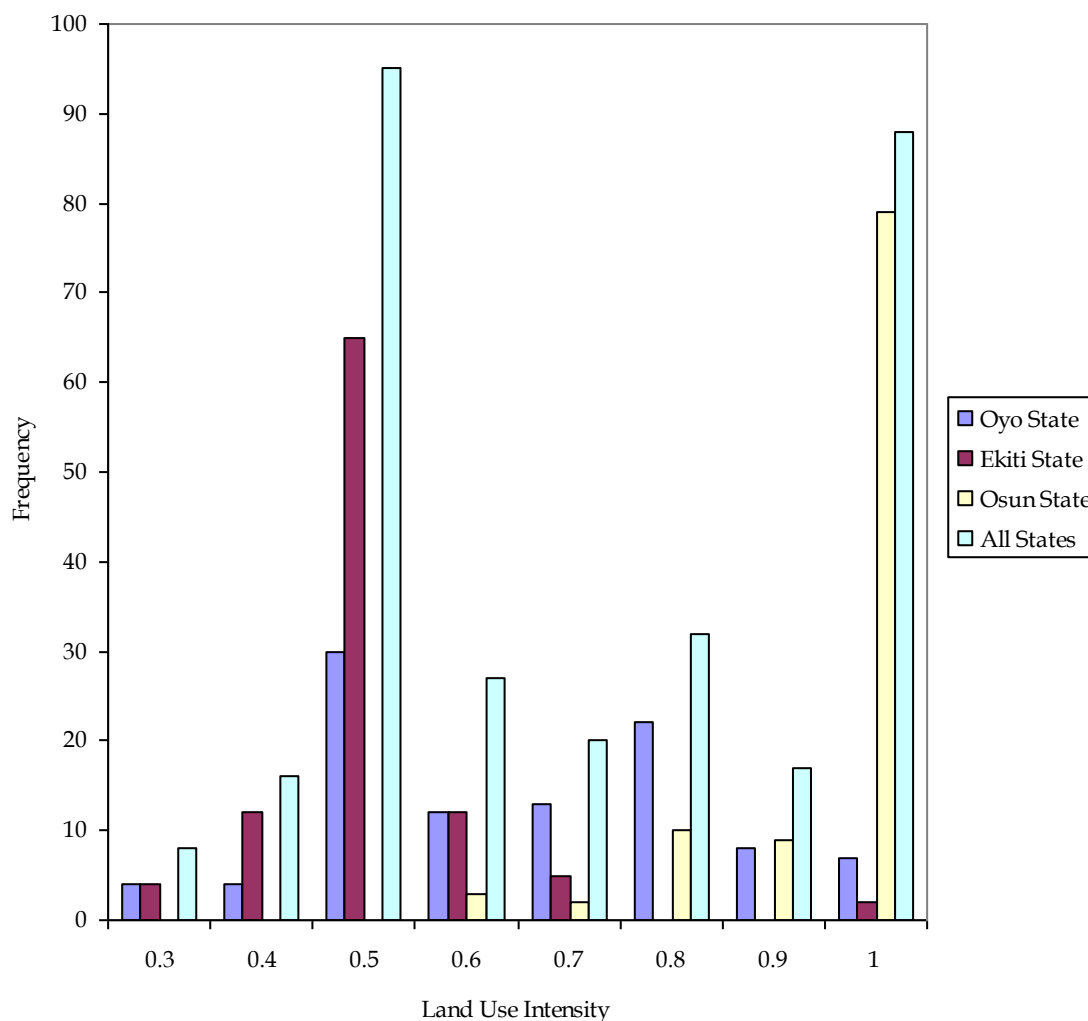


Fig. 1: Land Use Intensity Indices in Southwestern Nigeria

As farming experience increases, fertilizer use intensity and hired labour use intensity significantly decrease ($p < 0.05$). These findings reveal that as old and experienced farmers may not be able to afford or have access to fertilizers. Also, the experienced ones, who are also the oldest could not use much of hired labour. This might have resulted from possibility of having enough children to work on the farms.

Farmers with formal education have significantly higher crop diversification index (implying more specialization) and less family labour. Education may enhance the understanding of the farmers about the expected cropping intensity and the type of crops to be grown. In like manner, the educated may be involved in some non-farm income generating activities that make them employ less of family labour.



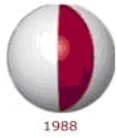
As household size increases, crop diversification significantly increases ($p < 0.05$). Intensity of family labour use increases significantly with increase in family size ($p < 0.01$). Also intensity of hired labour use increases significantly as household size increases ($p < 0.01$). The same applies to fertilizer use intensity that has positive sign and statistically significant ($p < 0.01$).

As the land hectareage owned through inheritance increases, land use intensity significantly increases ($p < 0.01$). In many rural areas, inherited lands are closer to the village than any other land areas and may because of this be subjected to continuous cropping. However, as the number of land hectareage owned through inheritance increases, family and hired labour use intensity significantly decreases ($p < 0.05$). Crop diversification indices and fertilizer use intensity significantly increase with increase in cropland purchased ($p < 0.10$), while family labour use intensity decreases. Hired labour use intensity significantly increase with increase in the hectareage of land owned through borrowing.

As market distance increases, hired labour use intensity significantly increases ($p < 0.01$). Poverty significantly increases have significantly lower intensity of hired labour use ($p < 0.01$) and crop diversification index. Lower use of hired labour may be due to inability to afford the daily wages for hiring labour. The finding for crop diversification shows that the poor plant many crops in order to meet his basic needs. The number of day that farmers lost due to sickness significantly increases land use intensity ($p < 0.01$). This is expected because sickly farmers may not be able to trek the long distance in search of fertile land. Therefore, inability to control common health problems in the rural areas may compel agricultural intensification in the form of continuous cropping.

Recommendations

Agricultural intensification in southwestern part of Nigeria will continue to increase due to scarcity of fertile arable land and decline in fallow periods. This study investigates the intensification processes and concludes that farmers are overexploiting the land nutrients by using continuous cropping and the agricultural production process is somehow labor intensive. The analysis reveals that increase in the number of days farmers could not go to work due to illness will result into increased land use intensity. The need to therefore ensure that health services are provided in the rural areas can be underscored. A healthy man will be able to go any distance in search of good land instead of continuously cultivating the ones available near the village. Increasing the rate of poverty will increase the number of crops that farmers cultivate on a plot of land and reduce the use of hired labour. Therefore, an attempt to reduce rural poverty is a clear way of ensuring sustainability in the agricultural production system. This is important because soil degradation can be aggravated due to unguided or excessive mixed cropping. Review of policy framework for poverty alleviation in Nigeria with a goal of ensuring that the rural households are fully catered for is essential.



The need to promote soil conservation practices is also buttressed by the findings of the study. It was found that application of fertilizer and the use of crop rotation increase land use intensity. This shows that with appropriate soil conservation technologies, intensive land use will increase. However, how sustainable this could be is beyond the scope of this paper. Moreover, planting of cover crops increases intensive use of family labour. Sustainable land use by means of planting cover crops is therefore labour intensive and any factor that hinders availability of family labour will have some adverse effects on their cultivation. Efforts set at developing hybrid of cover crops or planting technologies that will be less labour demanding will go a long way in promoting cultivation of these soil nutrient enhancing crops

Finally, the use of fertilizer increases land use intensity. However, this study clearly reveals that rural farmers no longer apply fertilizer in the right quantity to their crops. There is need to ensure timely provision of fertilizers to farmers in southwestern states. Encouragement of fertilizer production by indigenous industries will also increase supply.

Variable	Parameter for Land Use Intensity	Parameters for Crop Diversification	Parameters for Fertilizer Use Intensity	Parameters for Labour Use Intensity	Parameters for Hired Labour Use Intensity
Constant	0.2874*** (4.154)	0.4610*** (5.266)	-75.7972* (1.830)	11.6531 (1.174)	6.2025 (0.767)*
Bush burning	0.0496 (1.498)	0.0335 (0.776)	10.3575 (0.524)	8.8716** (1.848)	1.1820 (0.299)
Mulching	0.0265 (0.803)	-0.0125 (-0.291)	12.4779 (0.651)	-6.8334 (-1.417)	13.2707*** (3.337)
Crop rotation	0.1575*** (4.428)	0.0003 (0.006)	24.6973 (1.161)	3.3003 (0.634)	-3.6189 (-0.843)
Organic manure	-0.0721* (-1.826)	-0.0987* (-1.892)	-26.0865 (-1.088)	-3.3390 (-0.582)	1.9376 (0.407)
Cover crop	-0.0292 (-0.813)	0.0393 (0.846)	6.1553 (0.279)	11.7310** (2.235)	6.5776* (1.640)
Minimum tillage	-0.0016 (-0.044)	-0.1424*** (-3.019)	46.6742** (2.170)	3.7377 (0.716)	-2.9179 (-0.676)
Fertilizer application	0.1840*** (5.311)	0.0029 (0.066)	-	4.3808 (0.865)	1.4597 (0.350)
Farming experience	-0.00008 (-0.075)	-0.0001 (-0.095)	-2.0353*** (-2.830)	-0.1942 (-1.135)	-0.2738** (-1.960)
Formal education	-0.0041 (0.131)	0.0786* (1.912)	27.4867 (1.447)	-7.5224 (-1.643)	-0.8571 (-0.228)
Household size	0.0020 (0.384)	0.0160** (2.427)	16.1482*** (5.298)	2.2142*** (2.951)	2.3003*** (3.778)
Food cropland	0.0396*** (4.343)	0.0112 (0.955)	2.2898 (0.423)	-5.2064*** (-3.915)	-2.4423** (-2.267)
Food cropland	0.0232 (0.943)	0.0521* (1.650)	33.3411** (2.379)	-6.6866** (-1.860)	-0.9336 (-0.321)

Table 3: Tobit Regression Analysis of the Determinants of Agricultural Intensification in Southwestern Nigeria



Table 3: Cont.

Food	0.0717	0.0405	45.2578	-6.9879	13.4217**
cropland	(1.428)	(0.628)	(1.595)	(-0.947)	(2.277)
Market	-0.0007	-0.0068	1.9272	1.1874	1.6533***
distance	(-0.138)	(-1.050)	(0.631)	(1.606)	(2.733)
Poverty index	0.0019	-0.2415***	-12.6917	0.7381	-9.8608***
	(0.095)	(-8.605)	(-1.067)	(0.251)	(-4.019)
Lost working	0.0069***	0.0030	-1.4155	0.1569	-0.2168
days	(3.840)	(1.318)	(-1.143)	(0.595)	(-1.008)
Sigma	0.2438***	0.3054***	136.2225***	35.3075***	28.3640***
	(22.998)	(19.823)	(18.395)	(22.896)	(20.963)
Condition	16.39	16.39	15.61	16.39	16.39
Index					

Note: * ** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.10$ (t-statistics values are in brackets)



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DEVELOPMENT AND POVERTY

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According to World Development Report, in every hour 1.200 children die because of hunger and disease, also 1.2 billion of people are poor in the world. These people have only 1 \$ expense level to survive their lives. Besides, United Nations Food and Agricultural Organization (FAO) report emphasises that the main reason of the death and disease is nutritional deficiency, hunger, the poverty in developing countries and low literacy. Every year 6 billion people die because of starvation and poverty.

Countries mostly aim not only productivity increase in economic growth, also economic development that contains socio-economic growth. By the means of giving higher quality standards to society, development is indispensable competition. In recent years, according to development criteria, a very spacious measurement, Human Development Index (HDI) is used by United Nations Development Programme..

The concept of “Human Development” includes, quality of life, high education level and healthy and long life. According to the human development approach, together with the economic development, if there is a decrease in poverty, if income is equally distributed, if the state is increasing its social expenditures and finally if the legal system and democratic institutions are operating more effectively, then, we can talk about human development in that country. On the other hand, poverty is a very important barrier on the development.

The aim of this study is to expose the relation between poverty and development with HDI. The comparative approach will be made among the group of some countries within Turkey, cause Turkey is one the emergent country that have problems about socio-economic development.

Key Words: *Poverty, development, Human Development Index*



1.Introduction

According to United Nations, poverty is one of the most important problem in the world. In every hour 1.200 children die because of hunger and disease, also 1.2 billion of people are poor in the world. (World Development Report 2003). These people have only 1 \$ expense level to survive their lives. Besides, United Nations Food and Agricultural Organization (FAO) report emphasises that the main reason of the death and disease is nutritional deficiency, hunger, the poverty in developing countries and low literacy. Every year 6 billion people die because of starvation and poverty.

After the 1970's, less developed countries caught a high growth but the development of society and income distribution are not in optimum level. United Nations Development Programme (UNDP) named "Sustainable Human Development", a development strategy based on natural resources and environment in Human development Report in 1994. (Han ve Kaya, 2004; 229). This report emphasized the importance of inequality, poverty and sustainable development in the whole world.

2.The Meaning of Poverty

Poverty is understood in many senses. The main understandings of the term include:

- Descriptions of material need, typically including the necessities of daily living, like (food, clothing, shelter, and health care). Poverty in this sense may be understood as the deprivation of essential goods and services.
- Descriptions of social need, such as social exclusion, dependency, and the ability to participate in society. This would include education and information. Social exclusion is usually distinguished from poverty, as it encompasses political and moral issues, and is not restrained to the sphere of economics.
- Describing a lack of sufficient income and wealth. The meaning of "sufficient" varies widely across the different political and economic parts of the world.

Although the most severe poverty is in the developing world, there is evidence of poverty in every region. In developed countries, this condition results in wandering homeless people and poor suburbs and ghettos. Poverty may be seen as the collective condition of poor people, or of poor groups, and in this sense entire nation-states are sometimes regarded as poor. To avoid stigma these nations are usually called developing nations.

The World Bank defines extreme poverty as living on less than US\$ (PPP) 1 per day, and moderate poverty as less than \$2 a day. It has been estimated that in 2001, 1.1 billion people had consumption levels below \$1 a day and 2.7 billion lived on less than \$2 a day. (Gafar, 1998;592). The proportion of the developing world's population living in extreme economic poverty has fallen from 28 percent in 1990 to 21 percent in 2001. Much of the improvement has occurred in East and South Asia. In Sub-Saharan Africa GDP/capita shrank with 14 percent and extreme poverty increased from 41 percent in 1981 to 46 percent in 2001. Other regions have seen little or no change. In the early 1990s the transition economies of Europe and Central Asia experienced a sharp drop in income. Poverty rates rose to 6 percent at the end of the decade before beginning to recede.



There are various criticisms of these measurements. Other indicators of absolute poverty are also improving. Life expectancy has greatly increased in the developing world since WWII and is starting to close the gap to the developed world where the improvement has been smaller. Child mortality has decreased in every developing region of the world. The proportion of the world's population living in countries where per-capita food supplies are less than 2,200 calories (9,200 kilojoules) per day decreased from 56% in the mid-1960s to below 10% by the 1990s. Between 1950 and 1999, global literacy increased from 52% to 81% of the world. Women made up much of the gap: Female literacy as a percentage of male literacy has increased from 59% in 1970 to 80% in 2000. The percentage of children not in the labor force has also risen to over 90% in 2000 from 76% in 1960. There are similar trends for electric power, cars, radios, and telephones per capita, as well as the proportion of the population with access to clean water.

Relative poverty views poverty as socially defined and dependent on social context. In this case, the number of people counted as poor could increase while their income rise. A relative measurement would be to compare the total wealth of the poorest one-third of the population with the total wealth of richest 1% of the population. There are several different income inequality metrics, one example is the Gini coefficient.

In many developed countries the official definition of poverty used for statistical purposes is based on relative income. As such many critics argue that poverty statistics measure inequality rather than material deprivation or hardship. For instance, according to the U.S. Census Bureau, 46% of those in "poverty" in the U.S. own their own home (with the average poor person's home having three bedrooms, with one and a half baths, and a garage). Furthermore, the measurements are usually based on a person's yearly income and frequently take no account of total wealth. The main poverty line used in the OECD and the European Union is based on "economic distance", a level of income set at 50% of the median household income. The US poverty line is more arbitrary. It was created in 1963-64 and was based on the dollar costs of the U.S. Department of Agriculture's "economy food plan" multiplied by a factor of three. The multiplier was based on research showing that food costs then accounted for about one third of the total money income. This one-time calculation has since been annually updated for inflation.

Income inequality for the world as a whole may be diminishing. Even if poverty may be lessening for the world as a whole, it continues to be an enormous problem. (Stiglitz, 2000).

3. Causes of Poverty

Many different factors have been cited to explain why poverty occurs. However, no single explanation has gained universal acceptance. Some possible factors include:

- Poverty itself, preventing investment and development.
- Lack of capitalism For example, lack of private ownership of the means of production, excessive regulation, and the bulk of profits taken by the state.
- Poor, failed, or absence of an infrastructure, lack of opportunities.
- Government corruption.
- Lack of functioning democracy. Lack of social integration.
- Crime.



- Natural disasters.
- Substance abuse; such as alcoholism and drug abuse.
- Procrastination.
- Natural factors such as climate or environment.
- Historical factors, for example imperialism and colonialism.
- Overpopulation. Note that population growth slows or even become negative as poverty is reduced due to the demographic transition.
- War, including civil war, genocide, and democide.
- Lack of education.
- Lack of social skills.
- Exploitation of the poor by the rich.
- Even if not exploitation in the sense of theft, the already wealthy may have easier to accumulate more wealth, for example by hiring better financial advisors.
- Matthew effect— the phenomenon, widely observed across advanced welfare states, that the middle classes tend to be the main beneficiaries of social benefits and services, even if these are primarily targeted at the poor.
- Cultural causes, which attribute poverty to common patterns of life, learned or shared within a community. For example, some have argued that protestantism contributed to economic growth during the industrial revolution.
- Individual beliefs, actions and choices.
- Mental illness and disability, such as Autism, and Schizophrenia.
- Geographic factors, for example fertile land and access to natural resources.
- Disease, specifically Diseases of poverty: AIDS, malaria, and tuberculosis and others overwhelmingly afflict the poor, which perpetuate poverty by diverting individual, community, and national health and economic resources from investment and productivity. Inadequate nutrition in childhood in poor nations may lead to physical and mental stunting.
- High taxes.
- Age discrimination, gender discrimination, racial discrimination.
- Cost of goods for basic necessities.
- Lack of natural food in the environment - game animals, fish, roots, vegetables,

4. Measuring Human Development and Poverty

The UN Human Development Index (HDI) is a comparative measure of poverty, literacy, education, life expectancy, childbirth, and other factors for countries worldwide. It is a standard means of measuring well-being, especially child welfare. It is used by many people to distinguish whether the country is a developed, developing, or under developed country. The index was developed in 1990 by Pakistani economist Mahbub ul Haq, and has been used since 1993 by the United Nations Development Programme in its annual Human Development Report.

The HDI is a summary measure of human development. The HDI measures the average achievements in a country in three basic dimensions of human development:

- A long and healthy life, as measured by life expectancy at birth.
- Knowledge, as measured by the adult literacy rate (with two-thirds weight) and the combined primary, secondary, and tertiary gross enrolment ratio (with one-third weight).
- A decent standard of living, as measured by gross domestic product (GDP) per capita at purchasing power parity (PPP) in USD.



Each year, UN member states are listed and ranked according to these measures. Those high on the list often advertise it, as a means of attracting talented immigrants (economically, individual capital) or discouraging emigration.

An alternative measure, focusing on the amount of poverty in a country, is the Human Poverty Index.

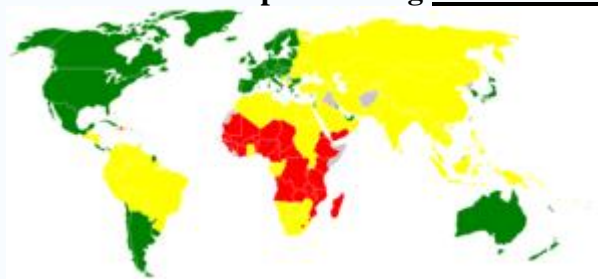
According to UN Human Development Index Report for 2005, in general, the HDI for countries around the world is improving, with two major exceptions: Post-Soviet states, and Sub-Saharan Africa, both of which show steady decline. Worsening education, economies, and mortality rates have contributed to HDI declines amongst countries in the first group, while HIV/AIDS and concomitant mortality is the principal cause of decline in the second group.

Most of the data used for the 2005 report, indicating country HDIs for 2003, are derived largely from 2003 or earlier. Not all UN member states choose to or are able to provide the necessary statistics. Notable absences from the list (excluding micro-states) are Afghanistan, Iraq, Liberia, North Korea, Serbia, Montenegro, and Somalia. While these countries are either unwilling or unable to provide data, they are generally considered countries of medium to low human development.

An HDI below 0.5 is considered to represent *low development* and 30 of the 32 countries in that category are located in Africa, with the exceptions of Haiti and Yemen. The bottom ten countries are all in Africa. The highest-scoring Sub-Saharan country, South Africa, is ranked 120th (with an HDI of 0.658), which is well above most other countries in the region.

An HDI 0.8 or more is considered to represent *high development*. This includes countries of northern and western Europe, North America, Republic of China (Taiwan), Japan, South Korea, Singapore, Australia, New Zealand, the Southern Cone, Israel, Kuwait and the UAE. Other countries that exhibit high human development amidst countries with lower HDIs include (with their position) Costa Rica (47th), Cuba (52nd) and Panama (56th).

Graph 1 : Coloured world map indicating Human Development Index (2005)



Countries—almost all UN member states and a couple of special territories—fall into three broad categories based on their HDI: **high**, **medium**, and **low** human development.



Index 0.80 to 1.00 : High human development
Index 0.79 to 0.50 : Medium human development
Index 0.49 to 0.00 : Low human development

1.		<u>Norway</u>	11.		<u>Japan</u>	21.		<u>Spain</u>
2.		<u>Iceland</u>	12.		<u>Netherlands</u>	22.		<u>Hong Kong</u>
3.		<u>Australia</u>	13.		<u>Finland</u>	23.		<u>Israel</u>
4.		<u>Luxembourg</u>	14.		<u>Denmark</u>	24.		<u>Greece</u>
5.		<u>Canada</u>	15.		<u>United Kingdom</u>	25.		<u>Singapore</u>
6.		<u>Sweden</u>	16.		<u>France</u>	26.		<u>Slovenia</u>
7.		<u>Switzerland</u>	17.		<u>Austria</u>	27.		<u>Portugal</u>
8.		<u>Ireland</u>	18.		<u>Italy</u>	28.		<u>New Zealand</u>
9.		<u>Belgium</u>	19.		<u>South Korea</u>	29.		<u>Cyprus</u>
10.		<u>USA</u>	20.		<u>Germany</u>	30.		<u>Barbados</u>

**Table 1:Top thirty countries (HDI range from 0.963 down to 0.878)
High Human Development**

Source:UN Human Development Index Report 2005

Turkey is an developing country in social and economic situations. Turkey's population of 62.8 m. is young and growing, it has the largest landmass in West Europe.

The trend towards liberalization goes back to the 1950s, but related action became more prominent in the early 1980s when many radical changes and structural reforms have been made in the field. The main components of this economic reform were reducing government intervention; implementing a flexible exchange rate policy; liberalizing import regulations; increasing exports; encouraging foreign capital investment; establishing free trade zones; deregulating financial markets; privatizing State Economic Enterprises, and decentralizing government activities.

Turkey's dynamic economy is a complex mix of modern industry and commerce along with a traditional agriculture sector. It has a strong and rapidly growing private sector, yet the state still plays a major role in basic industry, banking, transport, and communication. But after the 1980's liberal policies are taken from the goverment.

Real GNP growth has exceeded 6% in many years, but this strong expansion has been interrupted by sharp declines in output in 1994, 1999, and 2001. Inflation, in recent years in the high double-digit range, fell to 9.3% by 2004 - a 30-year low.



<u>Human development index (HDI) value, 2003</u>	0.750
<u>Life expectancy at birth (years) (HDI), 2003</u>	68.7
<u>Adult literacy rate (% ages 15 and above) (HDI), 2003</u>	88.3
<u>GDP per capita (PPP US\$) (HDI), 2003</u>	6.772
<u>Life expectancy index</u>	0.73
<u>Education index</u>	0.82
<u>GDP index</u>	0.70
<u>GDP per capita (PPP US\$) rank minus HDI rank</u>	-18

**Table 2: 94. Turkey's Human and income poverty: developing countries:
Medium Human Development**

Source: www.undp.org

Human Poverty Indeks for developing countries

DIMENSION

- | | | |
|----------------------------|--------------|--------------------------------|
| a) A long and healthy life | b) Knowledge | c) A decent Standard of living |
|----------------------------|--------------|--------------------------------|

INDICATOR

- | | | |
|--|--------------------------|--|
| a) Probability at birth of not surviving to age 40 | b) Adult illiteracy rate | c) Percentage of population not using improved water sources |
|--|--------------------------|--|

Source: UNDP, (2001), "Human Development Report 2001", Making New Technologies Work For Human Development, Oxford University Press, P.: 239, New York.

4. Eliminating poverty

In politics, the fight against poverty is usually regarded as a social goal and many governments have — secondarily at least — some dedicated institutions or departments

- The anti-poverty strategy of the World Bank depends heavily on reducing poverty through the promotion of economic growth. However, some consider this approach does not actively or directly work to reduce or eliminate poverty. The World Bank argues that an overview of many studies show that:

- Growth is fundamental for poverty reduction, and in principle growth as such does not seem to affect inequality.

- Growth accompanied by progressive distributional change is better than growth alone.

- High initial income inequality is a brake on poverty reduction.

- Poverty itself is also likely to be a barrier for poverty reduction; and wealth inequality seems to predict lower future growth rates

- Research on the Global Competitiveness Report, Ease of Doing Business Index, and Index of Economic Freedom and suggests that a set of economic conditions which help increase growth and reduce poverty.



- Business groups see the reduction of barriers to the creation of new businesses or reducing barriers for existing business, as having the effect of bringing more people into the formal economy.
- Direct Aid: The government can directly help those in need. This has been applied in most Western societies during the 20th century in what became known as the welfare state. Especially for those most at risk, such as the elderly and people with disabilities. The help can be for example monetary or food aid.
- Private charity. This is often formally encouraged within the legal system. For example, charitable trusts and tax deductions for charity.

5. Millennium Development Goals

Rising inequality in the developing world has also created new challenges for meeting the poverty Education goals. In the 1990s within country inequality rose in every region but the Middle East and North Africa, and Sub-Saharan Africa now has the same inequality as Latin America.

Inequality also climbed in the fast-growing East Asia region. In Vietnam the Gini coefficient of inequality grew by 2.3 percent a year between 1993 and 2002, and in China, 2.0 percent a year between 1990 and 2001. This rise reduced the impact of growth on poverty reduction and will undercut its future impact. It is well-known that broad based growth and low initial inequality are critical to accelerating progress toward the poverty goal. The most successful East Asian countries in the 1970s and 1980s showed that low initial inequality combined with rapid growth and pro-poor distributional change could be very effective in reducing poverty (World Bank 1993).

More recently, the role of fast growth, low initial inequality and pro-poor distributional change has been highlighted by cross-country and household analysis. Examining variations in changes of poverty levels across a sample of developing countries for the 1980s and 1990s, Kraay (2005) found that growth accounted for just over two-thirds of the changes in relative incomes in the short run, and inequality and distributional change for the rest. The impact of growth on poverty reduction becomes even larger over longer time intervals, but much smaller over shorter time intervals (and the impact of inequality changes consequently much larger) (Bourguignon 2004).

Eradication of extreme poverty and hunger by 2015 is a Millennium Development Goal. In addition to broader approaches, the Sachs Report (for the UN Millennium Project) proposes a series of "quick wins", approaches identified by development experts which would cost relatively little but could have a major constructive effect on world poverty. The quick wins are:

- Eliminating school fees.
- Providing soil nutrients to farmers in sub-Saharan Africa.
- Free school meals for schoolchildren.
- Supporting breast-feeding.
- Deworming school children in affected areas.
- Training programs for community health in rural areas.
- Providing mosquito nets.
- Ending user fees for basic health care in developing countries.
- Access to information on sexual and reproductive health.



- Drugs for AIDS, tuberculosis, and malaria.
- Upgrading slums, and providing land for public housing.
- Access to electricity, water and sanitation.
- Legislation for women's rights, including rights to property.
- Action against domestic violence.
- Appointing government scientific advisors in every country.
- Planting trees.

Conclusion

As countries become more developed, governments can supplement the market incomes of the poor with public transfers, allowing poor households to benefit indirectly from growth through redistributive policies. But the country cases suggest that public transfers had a fairly minor role, given financial and administrative capacity constraints, and did not substantially affect poverty or the distribution of income.

Economic development takes a meaning as long as it solves the issues of social infrastructure, poverty and inequality. When economic development is completed with developments obtained in the social area in matters of education and health, it realizes permanent growth and completes the strategy of development with a quality of preventing poverty.

In order to solve the issue of poverty which is one of the main topics of the development economics, in addition to economic growth it is necessary to provide investment in mankind, to obtain economic balance and stability, to decrease inequality, to promote investments. A qualified workforce supported by education and health services, with industrialization policies and the support of strong financial markets the market mechanism indexed to productivity and competitive power will make an important contribution.

Although it may be a blatant truth that the development process removes poverty, the focus of political economy on the target of development is an inevitable necessity. The permanent development dynamics based on quality workforce constitutes the foundation of the new competition concept.



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ALLEVIATION OF RISKS AND VULNERABILITY FACING ISOLATED COMMUNITIES THROUGH CONSERVATION AND MANAGEMENT OF BIO-DIVERSITY: THE LOWER KUISEB RIVER BASIN, NAMIBIA

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Aridity characterizes an expansive area of Southern Africa and almost the whole of Namibia. Although known to be hot and dry, Namibia is characterized by a wide range of microclimates and varying habitats that include some sizable wetlands rich in biodiversity that supports a wide range of plant and animal life. The Namib, the oldest desert in the world, straddles the extremely arid coast of Namibia along its border with the Atlantic Ocean. The Kuiseb River Valley forms one of seven linear oases traversing the Namib Desert. The Kuiseb River Valley and other linear oases traversing the Namib are dotted with numerous small settlements whose inhabitants, depending on the bio-resources, until recently, had successfully adjusted to the conditions created by varying hydrological and climatic elements. Indigenous groups settled here include the Topnaar of the lower Kuiseb valley who had over the last few centuries sustainably exploited the biological resources for food, medicine and fodder for their livestock. Their survival techniques were greatly determined and shaped by the biological resources as determined by climatic variability characterizing their narrow relatively moist habitat along the lower Kuiseb valley. However, recent new developments and interventions in the upper and lower reaches of the valley tipped the scales against the Topnaar. The paper discusses the interactions between biological resources, habitat modifications and society in the lower Kuiseb valley through time and by analyzing recent developments and interventions in the Kuiseb River basin management strategies, highlights undermining of old-age coping mechanisms and increasing vulnerability to risks facing the Topnaar. The strong community spirit and community based activities have been thrown into disarray; the very existence of the Topnaar settlements hangs in balance. Conservation and management of biodiversity based on people centered planning should be adopted where social, economic and environmental consequences of an undertaking are given deserving emphasis. Conservation strategies ought to be multi-disciplinary in nature and consider the entire river basin. Social-economic as well as environmental impacts should be considered alongside the often over-emphasized profit maximization. Stable policies that form part of broader national development strategies need to be formulated and/or revised so as to enhance resilience to dwindling biological resources dictated by recent interventions leading to biodiversity changes affecting the indigenous community inhabiting the lower Kuiseb River Valley. Strong partnerships and indigenous knowledge considerations are necessary to ensure that all aspects of the biological resources on which the inhabitants depend on are included in such studies.



INTRODUCTION

Namibia, a large country (823,680 km²) with a coastline 1,440 km long, is located on the west coast of the Southern Africa sub-continent (Fig 1). Namibia is a dry country with very limited water resources; its climate is the second in aridity to that of the Sahara (Bethune, 1996; Mendelshon et al, 2002). The rainfall is variable, unpredictable and unreliable; it varies between 20mm along the west coast to 850mm in the extreme northeast. The rainfall occurs mainly during summer months for most parts of the country, the southwestern part receiving winter rainfall. Evaporation rates are extremely high throughout the country; the average evaporation rate being 2500mm in the northwest and 3700mm in the southeast (Bethune, 1996, Christellis & Struckmeir 2001).

Namibia's climate is highly variable and difficult to understand. It is a direct interplay of various factors including its relative location on the southwestern part of the Africa continent, spanning a zone between 17° and 29° south of the equator. Thus Namibia is exposed to air movements driven by three major climatic systems. The Intertropical Convergence Zone (ITCZ) feeds in moisture-laden air from the north while the Sub-tropical High Pressure System positioned across the country pushes the moist air back with dry cold air. The effect of this system is more pronounced than that of the ITCZ so that Namibia is characterized by dry hot weather for most of the year. The Temperate System to the south of the country with predominantly moisture laden westerly winds which carry a succession of low pressure systems and cold fronts from west to east feeding bursts of cold air from the Antarctic, sweep across southern Africa during southern hemisphere winter, bringing some moisture to the south-western part of Namibia. These three systems move south and northwards in response to the overhead sun (Mendelson et al 2002). (Fig 1).

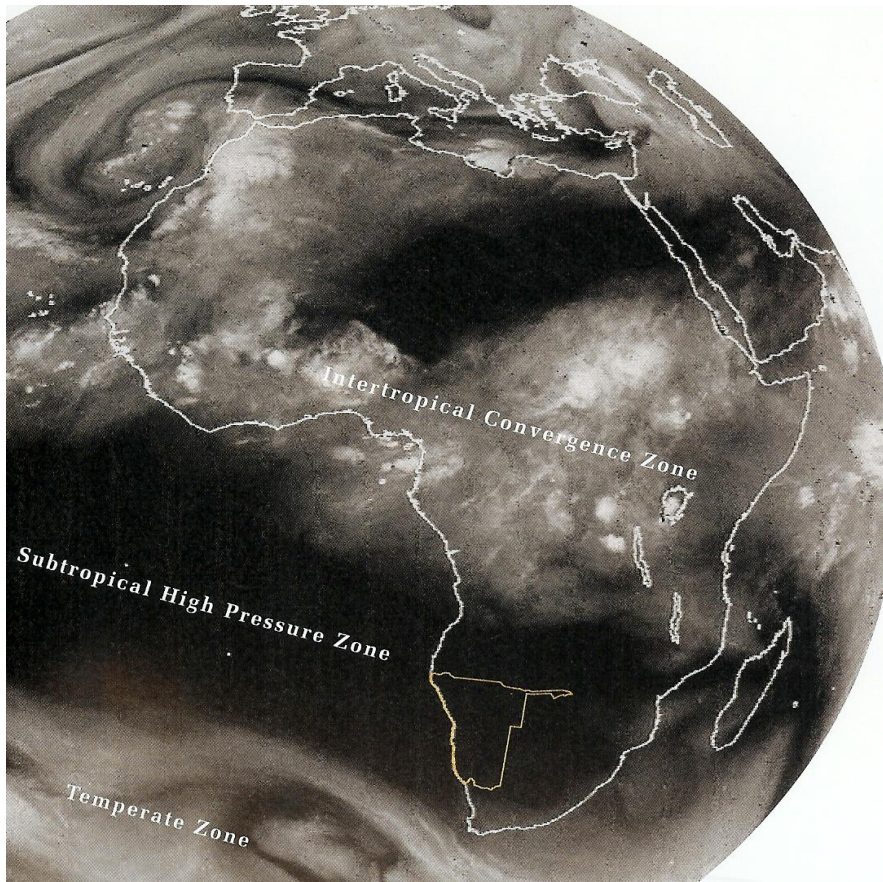


Figure 1: Major Climatic Systems Affecting Namibia

Other factors influencing the climate in Namibia include the cold Benguela current flowing from South Atlantic Ocean and the Drakensberg range mountains that span the eastern coast of the continent. The cold current cools the easterly flowing air stream from below occasioning fog formation along the coast extending to about 100 km inland. No clouds form and therefore most years pass without rain in this part of the country. The mountain range along the eastern coast of Southern Africa force moist airstreams to rise, condense and drop most of the moisture on its eastern side descending as dry air on the mountains' western side reaching Namibia as dry airstreams; thus the presence of the Kalahari desert on the eastern part of Namibia.

Although known to be hot and dry for most of the year, Namibia's climate is highly variable. Temperatures and rainfall vary greatly over space and time, variability being compounded by the shifts in the relative position of the three major climatic systems. Temperatures are usually very high for most part of the year (in the mid and upper 30°C reaching 40°- 44°C in the northern and southern part of the country as well as over the Namib Desert only cooling off during the short winter period. Winds blow strongly for most part of the year being strongest along the coast where dry hot sand-laden winds fill up hand dug wells and compounding difficulties and risks facing communities dependent on natural resources exploitation for their livelihood.



KUISEB RIVER VALLEY:

In Namibia, there are only four perennial rivers that are confined to the southern and northern borders of the country. They are shared with neighbouring countries of Angola, Zambia, Botswana and South Africa (Msangi, 2005). Due to vast distances, the high costs of water abstraction and transfer as well as high evaporation rates, these rivers are not extensively utilized. Namibia largely depends on groundwater and twelve westward flowing ephemeral rivers that have been dammed severally (Table 1). The ephemeral rivers with catchments in more relatively wet parts of the country (250-600mm), flow westwards to disappear into the Namib sands and gravels before emerging as springs and discharges at the ocean margin or discharge directly out to sea as groundwater base flow. A few of them traverse the desert forming oases across the Namib offering habitats to both people and animals inhabiting the desert.

SOURCE	QUANTITY	REMARKS
Groundwater	300Mm ³ per year**	Long-term sustainability
Ephemeral Surface Water	200Mm ³ per year	95% assurance of supply
Perennial Surface Water	150Mm ³ per year	Installed abstraction capacity 2001
Unconventional	10Mm ³ per year	Reclamation, re-use and recycling

Table 1: Water availability in Namibia: (dependent on precipitation and aquifer size)

** Some of the groundwater reserve exists as fossil water in aquifers found below the earlier larger lake that covered areas in northern Namibia and southern Angola. This water accumulated tens of thousands of years ago when the climate in Southern Africa region was much wetter than now.

Source: Christelis, G and Struckmeir (eds.) (2001): Groundwater in Namibia.

The Kuiseb river valley forms one of the oases traversing the central Namib Desert. The Kuiseb river catchment is the third largest of the ephemeral rivers with an area of approximately 15, 500 km (Jacobson et al, 1995). Its source lies at 1,500m above sea level on the Khomas Hochland mountain plateau near Windhoek (Map 1). After crossing the Namib it empties into the Atlantic Ocean through a 30 kms wide delta. Variable rainfall is received over the catchment area; an amount of 400mm is received in the upper catchment (Botelle & Kowalski, 1995) and 21 mm in the lower catchment (average for 32 years -1962-1992) (Henschel et al, 2004). Like the rest of the country, rainfall varies considerably not just over space but over time as well. Temperatures are extremely high in the lower catchment area during the day particularly during summer months dropping to below freezing during winter; evaporation rates are astronomical made worse by the strong desiccating winds characterizing the lower reaches of the valley.



While the 20mm received at the lower catchment is augmented by fog varying between 30mm-180mm per year (Botelle & Kowalski, 1995), it is important to note that all life forms for the lower catchment is concentrated along the riverbed and therefore interventions in the upper catchment directly affects the life at the lower catchment of the Kuiseb. An array of life forms including plants and animals depends on the fog for their water needs.

The upper catchment comprising 63% of the Kuiseb catchment supports 109 private farms and a large number of livestock and wildlife (Jackobson, et al 1995). These private farms depend on 407 farm dams and 591 subsurface water sources of which 90% are boreholes. These interventions dating only back to the mid 1970s have reduced the runoff from the Khomas mountains and the escarpment by 21% thus drastically reducing runoff reaching the lower catchment area of the Kuiseb where the Topnaar community is found (Botelle & Kowalsik, 1995). The lower catchment life forms rely heavily on the flow from the upper catchment (either periodic floods or subsurface flow) that has been heavily reduced by the interventions in the upper catchment. High floods reaching the delta have only been recorded in 1990/1991, 2000 and 2006.

During earlier times, the floods brought down not only much needed water to the lower Kuiseb but also nutrients for the woodland vegetation and home gardens as well as logs for fuel wood and for protecting wells and fencing off the gardens. Recent years have seen a decline in the frequency as well as magnitude of the floods. Recent years have also witnessed much fluctuation in the structure and density of the riverine vegetation. The fluctuations in the woodland structure being a direct outcome of the reduced flood frequency that determines water and nutrient availability in an otherwise barren desert sand dunes and gravel environment. The riverine vegetation and abundance of other resources have fluctuated with the flooding regime of the river. According to recent surveys carried out on the woodland resources of the lower Kuiseb, there are many climatic and hydrological cycles (seasonal, yearly, wetter periods and drier periods), each superimposed one on top of the other (Botelle & Kowalski, 1995). As a result the lower river system is very fragile and dependent on the erratic rainfall and abstractions further up-river. Thus hydrological changes taking place upstream directly affects life forms downstream.

TOPNAAR COMMUNITY:

The Topnaar are a community of about 300 inhabitants of hunters and gatherers living in the lower Kuiseb valley in the Namib Desert (Map 2). One of the oldest indigenous people of Namibia belonging to the Khokhoen who have lived in the Namib Desert for many centuries, traditionally depended on small stock farming, vegetable gardening and !nara harvesting and processing for their livelihood. The Topnaar were identified through their association with the !nara plant, a cucurbit adapted to the Namib. A leafless thorny melon-bearing bush, the !nara is an important component of the dune ecosystem providing shelter and food to many different animals. It survives the harsh environment by tapping water from deep underground (down to 40-60m deep) through its deep tap root. In the past individual Topnaar families claimed ownership to individual !nara plants. This ownership was recognized and respected by other families in the community (Map 3).



The Topnaar community had evolved a self-sufficient system where the whole family served as a productive unit around which multiple activities like food and clothing production were organized. They had learnt to live and interact with their ever changing environment determined by the inherent climatic variables which shaped the way they utilized what was available in their natural physical environment (Henschel et al, 2004; Botelle & Kowaliski, 1995). The Topnaar had adjusted to their environment and sustainably exploited natural resources to obtain food, shelter and later since mid nineteenth century traded with outsiders to obtain consumer goods not available in their immediate environment.

The Kuiseb River was and still is the lifeblood of the central Namib Desert, the home to the Topnaar community. However fast changing policies and subsequent interventions are negating earlier interactions and adopted strategies. Studies conducted during mid 1990s and early 2000s, have revealed that in the past the Topnaar moved up and down over a vast area (about 200 kms along the valley) in search of food and building materials. They also moved freely along the narrow seaboard along the Atlantic Ocean fishing and scavenging local marine resources. They evolved a land tenure system, utilizing a wide range of resources determined by the climatic variability of their otherwise harsh desert environment. They moved their livestock to the upper reaches of the valley during low rainfall periods and back to their homeland in the lower Kuiseb during wetter periods. During lean times when the land did not have much to offer they relied on the sea to augment whatever their gardens and livestock offered them (Botelle & Kowaliski, 1995; Henschel et al, 2004).

Although the Namib has always been the driest and barren part of the country, the Kuiseb river regime enabled the Topnaar to live and sustainably use the bio-resources therein for thousands of years. However, what is emerging today is a people unable to cope with their arid environment and unable to make a living from the land in the same way as they did in the past. The field studies conducted during the last 10 years, have demonstrated that although droughts and floods always occurred interchangeably in the lower Kuiseb, in the past, the people had devised sustainable coping strategies through manipulating the available bio-resources and adjusting to these environmental vagaries. However, currently, their social organization and their economy are in a state of flux; the Topnaar have a much smaller area in which to maneuver. They live in more or less sedentary settlements dependent more on inputs from outside their environment due to various interventions which have not only confined them to a smaller area but have also changed the river regime and the nutrients brought down by the floods to support the rich vegetation and home gardens.

INTERVENTIONS

Detailed analyses of the various interventions through time have been presented in various documents. However, according to the book by Henschel and others, the first event that reversed the trend and way of living for the Topnaar occurred as a consequence of political developments affecting Namibia as a country. In 1884 Namibia, then a British colony was transferred to German rule and in 1920 the country was entrusted to South Africa by the League of Nations. A direct consequence of these shifts in colonial powers was the development of fishing and harbour industries in Walvis Bay at the delta of the Kuiseb River. Many coastal Topnaar moved further inland while others were absorbed into the industrial workforce. Further developments at Swakopmund necessitated the construction of water extraction schemes along the lower Kuiseb Valley at Rooibank (1927) and near Swartbank



(1960's), both main Topnaar settlements. In 1962 a high flood barrier was constructed in the Kuiseb delta to protect Walvis Bay from flooding whenever the river flooded. This blocked the river surface flow thus reducing groundwater recharge in the northern delta area. This killed some of the !nara fields and lowered productivity from 1970 onwards. This further led to the abandonment of long established tending practices such as family ownership of the !nara plants to communal ownership due to the fact that some families lost their plants in the northern delta area. Communal ownership of the fields ruined the caring practices of the plants as it led to over harvesting and general mismanagement of the fields (Henschel et al, 2004).

It is further stated that while all this was taking place in the lower catchment area, developments in the upper reaches of the valley occasioned the construction of private farm dams with the resultant effect of lowering the water table in the lower reaches of the Kuiseb thus negatively affecting the riverine vegetation and the water source of the Topnaar who depended on hand dug wells for their domestic water needs and that for their animals and home gardens.

The second event that tipped the scales against the Topnaar is documented to be the proclamation of the Namib Game Reserve by the German colonialists in 1907 and the establishment of the Namib-Naukluft Park by the South Africa Government in 1975. The formulated park regulations were in direct conflict with traditional land use practices of the Topnaar such as periodic hunting of wild game for meat and the trapping of predators that killed their domesticated animals. Also prohibited by these regulations is the burning of the !nara bushes to improve productivity (Henschel et al, 2004). In the same publication, it is documented that the park boundaries limits the freedom of movement of the Topnaar in response to the variable climatic conditions within the Kuiseb valley. Park rules are reported to have influenced and eroded gender roles that once supported traditional systems of land tenure. Key land use activities that once satisfied the needs of entire households are reported to require supplementation with new sources of income, food and shelter.

Furthermore, the third event that led to changes in the situation facing the Topnaar is documented to be the sinking of deep boreholes (down to 10-30m deep) fitted with a windmill or a diesel pump engine to supply all settlements with domestic water and for their home gardens. The outcome of this undertaking is reported to have caused further lowering of the water table and hence the final death to hand dug wells for the Topnaar. Further negative impact of this intervention is the fact that the windmills pump water continuously and subjecting it to evaporation (wastage of a scarce and valuable resource) while the diesel pumps require diesel, which is not easy to get in these remote settlements. In the absence of wind, it is reported that people go without water for long periods. The situation becomes worse when once consideration is given to the fact that the people are not trained to maintain these engines and where an engineer attached to the settlements is available; the spare parts are difficult to come by due to either the unaffordable high costs of the parts or unavailability. Another observation on the disadvantage of the boreholes as permanent water sources is that the Topnaar have become more or less permanently settled. Permanent water source encourage growth in livestock numbers and subsequently over utilization of water, grazing and the deterioration of land and other resources. The Topnaar no longer move their animals up and down the valley because of prohibitive park regulations.



Additionally, another event that affected the Topnaar and their bio-resources management practices was the independence of Namibia in 1990. Article 95 of the country's constitution states that "The state shall actively promote and maintain the welfare of the people by adopting, *inter alia*, policies aimed at improving the following: maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all users to make a living from the land..." However, to date, the issue of actions to be taken by independent Namibia Government to reverse actions taken during colonial times that have negatively affected the indigenous residents of lower Kuiseb Valley remains unresolved. According to available literature, there is uncertainty as to how to satisfy the different needs of all resource users living in the entire Kuiseb catchment.

Furthermore, it is reported that the establishment of the Walvis lagoon in 1990 introduced additional restrictions on the area available to the Topnaar to occupy and practice their traditional land use and bio-resources management practices particularly those surrounding the harvesting and processing of the !nara. As stated in paragraphs above, the earlier interventions in the upper catchment lead to the reduction of silt load reaching the lower valley and its delta. This has in turn led to a chain of related impacts including a receding shoreline by wave action, salinization of some of the coastal dunes where rich !nara fields were located and substantial loss of productivity of the fields which has further robbed the Topnaar an avenue of practicing their annual migration to the delta to harvest and process the !nara, previously an important source of food and income.

Other documented interventions that have affected the Topnaar of the lower Kuiseb include the urban developments along the coast in the vicinity of their traditional land area. The towns of Walvis Bay and Swakopmund have acted as a pull factor to the process of rural-urban migration for the Topnaar. This has influenced the way of life in the various settlements whose considerable numbers of working-age men and the youth have migrated to the towns to seek employment. Some send back cash, consumer goods and clothing to their family members back in the settlements while some have abandoned their villages altogether and settled in the poor sections of the two towns. Western way of life has penetrated some parts of the Topnaar settlements introducing inequalities not inherent before. Like in the case of all urban poor neighbourhoods where the unskilled and uneducated Topnaar migrants find themselves living in, alcoholism and petty crime is affecting the entire extended families both in the rural areas and in the urban segments. The quality of life for some part of the community is reported to be deteriorating fast.

It is reported that in the past, entire families carried out important activities together and family members complemented each other by dividing their labour along gender lines. For example extended families moved *en masse* to the Kuiseb delta to harvest the !nara during summer months (December-March). Women stayed near the camp to process the !nara and carry out domestic chores while the men and older boys were away collecting !nara fruit and selling the !nara pips. While the division of labour is still evident, currently, gender roles are less clearly defined. Social and economic activities are carried out by both men and women who make decisions independently as individuals rather than as a family unit. Unheard of in the past, women, like men, exchange stock for consumer goods and collect second hand building materials from the neighbouring towns to construct their make shift homes and to fence gardens.



The Topnaar are highly dependent on the riverine vegetation. Various tree species which provided building materials, fuel, stockades medicine and fodder no longer satisfy their needs due to lowered water table and subsequent dying off of some of the vegetation. The Topnaar's reliance on the river and its ability to support plant life has left them vulnerable to the highly variable river regime especially during droughts when upstream users let through little or no water at all for the down stream users or during years with excessive rain when the upstream users let through excess water from their dams resulting in floods and destruction of property and !nara fields downstream (for example 2006 rain season). In the past the Topnaar overcame the Kuiseb's climate and hydrological variability by adopting a variety of strategies such as moving their stock along the river and balancing their reliance on riverine vegetation with other resources in the delta and from the sea. Currently this is not possible due to the park rules, the fishing regulations and restrictions as well as Walvis Bay municipality regulation.

The rural-urban migration as well as schooling is said to have deprived the rural area of labour reserves. The better off Topnaar see formal education as the way out of their deteriorating quality of life. Families struggle to send their children to school in the hope that they will do well and secure good jobs that will generate a source of livelihood for them back at the settlements. This in turn has deprived the rural areas of much needed labour to look after livestock and harvest the !nara. Schooling has altered household division of labour and the way natural resources are utilized. The poorer families loose out to wealthier and well connected ones. The rural population find themselves more and more alienated from each other as their struggle has become that of survival of the fittest, giving less and less consideration for each other. Whoever reaches the !nara fields first harvests everything including unripe fruits which deprives others and at the same time lower the quality of the pips and therefore fetches less income. A new trend is reported to have emerged in recent years where the people are less and less dependent on each other and their own initiative; rather they look to the Government and outside NGOs for solutions to their problems. Solutions that are not readily available!

IMPLICATIONS OF INTERVENTIONS

The above interventions have produced many negative implications for the lower Kuiseb valley Topnaar. The changed river regime has jeopardized Kuiseb's inherently fragile environment. With permanent water sources, the Government discourages the movement of stock. Fewer and fewer Topnaar travel to the delta to harvest and process !nara melon and no Topnaar exploit marine resources as they did in the past. They are only dependent on dwindling riverine forest resources thus remaining very vulnerable to the dying off vegetation resources. The anaboom tree on which livestock depended on has completely collapsed (Botelle &Kowalski, 1995) leaving the livestock to feed from less palatable species which has adversely affected the milk and meet quality. Other species such as palm trees are also said to be dwindling and those that remain such as fig trees do not bear fruit. To compound this vulnerability is the unsustainable exploitation of the groundwater resources.



Similarly, wildlife that formed an important part of the Topnaar diet is reported to have ceased frequenting the valley with the dying of important tree species. Animals such as elephants, rhino, leopard, lion and giraffe no longer visit the valley while springbok, gemsbok, ostriches and wild dogs and cats, and hares, are much fewer in number and less frequent due to building of farm dams and fences upstream which obstruct migration routes. All that is left are the destructive predators such as jackals and hyena, which kill livestock in the absence of wildlife. In the past there was a period set aside for hunting wildlife, a period outside mating and calving season. The Topnaar only hunted for food and skins, never contravening established traditional regulations. Currently, it has been observed that individuals hunt excessively whenever it is possible because otherwise they are hunting against park regulations.

The Topnaar continue to live in their traditional land and remain relatively isolated. Poorer than they were in the past, they continue to adjust to changing situations and have devised new coping mechanisms of utilizing their traditional land despite its reduced size and deteriorating environmental health. Most families are reported to still keep livestock (mostly small stock and no cattle) and harvest and process !nara or keep home gardens albeit smaller than before the interventions. The Topnaar acknowledge that some land uses such as livestock farming exert great pressure on their much-reduced land yet without viable alternatives, they are forced to overuse an already stressed environment (Botelle & Kowalski, 1995). The earlier key land use activities that once satisfied the needs of entire households have to be supplemented with new sources of income, food and shelter. Subsistence activities are less secure and thus emigration is on the increase. Many are emigrating to seek employment opportunities elsewhere yet without skill and education, the immigrants are very vulnerable and are subjected to great risks in their new habitats.

CONCLUSIONS AND RECOMMENDATIONS

Recent studies have demonstrated that since time immemorial, the Topnaar community of the lower Kuiseb had established a thriving livelihood based on bio-resources exploitation. Currently the Topnaar live in a marginalized socio-economic situation; their livelihoods based on livestock rearing and !nara harvesting and processing with some pension and remittance from town-employed members of their extended family. They no longer have access to marine resources that used to be a mainstay of their livelihoods. Future of the socio-economy based on bio-resource management looks bleak for the Kuiseb Topnaar. It is recommended that what could get the Topnaar out of this depressing situation is not abrupt abandonment of traditional life style; rather concerted efforts to promote wise-use of the bio-resources that would encourage gradual social change through value addition to products manufactured locally. Building indigenous small enterprises that neither depends on external guidance nor on alien processes and products will lead to increased opportunities for training and recruitment from within the community thus enabling the community to improve its livelihood. What the community requires is assistance and cooperation of interested parties to enable it realize these goals (Henschel, 2004).



The study conducted in 2000 and published in 2004 involving a cross-section of the Topnaar community members, primary and secondary wholesalers and retailers as well as relevant Government institutions and NGOs, concluded that with training and better resource management, the quality of livelihoods could be substantially improved. It is observed that the potential for developing sustainable bio-resources management exists so long as cooperative management techniques are resorted to. It is therefore recommended that development of any available local potential should be encouraged so as to reduce importation of foreign products and processes because importation tends to alienate people from their local environment, resources, traditions and skills. Reliance on livestock under the constraints of limited resources in the Kuiseb Valley demonstrated no future; on the other hand improved !nara management could lessen this dependence and conserve the constrained and degraded riverine bio-resources. The study further recommends using traditional knowledge and principles of community-based natural resources management to increase sustainability. Recommended also is improved marketing of !nara seeds and other products that could be generated from !nara fruit. Efforts ought to be made to increase incentives to those involved in harvesting and processing of the fruit so that they have direct access to the seed markets. The aim is to maximize profits for the !nara harvesters/processors and eliminating the middlemen so as to cut down on distribution and handling costs.

Furthermore, it is observed that while it is not possible for the Topnaar to completely divorce all newly acquired features in their way of life, it is important that they be assisted to adopt profitable and modern aspects of communal farming and aspects of rural entrepreneurship. This could include for example diversified micro-enterprises that would produce consumer products required by the rural community as well as others such as handcrafts, which could be marketed in the nearby crafts outlets in the neighbouring towns. The documentation observes that the community requires encouragement to work together again as family units forming units of a cooperative society so that there should be equal access to the resources, markets and profits accruing from whatever processed products from !nara and other local resources. Urgent support and assistance in promoting eco-tourism and appropriate product-packaging to improve their marketability is necessary. Observed also is the fact that tourism could serve as an outlet for the handcrafts and other locally produced products.

Other conclusions of the study include the fact that it is important for the Topnaar to diversify the products from their local resources particularly the !nara plant. The study identified several products that could be produced from !nara. These include staple food for the community, dried or roasted seeds, various baked products, oil/body lotion, dried fruit flesh, jam, juice, liqueur, medicinal products from root or stem extracts and a range of souvenirs. Equally as important is the need to legally protect the prospective !nara products through registration and acquisition of a trademark (Henschel et al, 2004). Future success in this area lies in further research on potential products from !nara and identification of possible marketing outlets. Cooperation between the Topnaar and research organizations and supporting institutions (both Governmental and Non-governmental organizations) is appreciated as essential in securing a future for the products and stimulating community development.



The Government and the Walvis Bay Municipality need to review the policies that are negatively affecting bio-resource usage and conservation at the lower Kuiseb Valley. Policies on land use and land conservation ought to take into consideration the needs of the entire Kuiseb River Basin bearing in mind the fact that the lower catchment is being adversely affected by the activities being undertaken in the upper and middle sections of the basin. While earlier reactions of the Government were to relocate the Topnaar to another part of the country, this was done without proper consultations with the community (Henschel et al, 2004). If indeed relocation is unavoidable due to earlier decisions already implemented such as the establishment of the Naukluft Park and vital commercial farms, there is need to conduct proper consultations, education and training involving sociologists, social workers and land use planners as well as the entire community. Proper assessment of properties that would be left behind need to be undertaken, compensation worked out and receiving area well prepared in advance of relocation exercise. Successful translocation of the community should bear in mind the fact that giving ones home, culture and all that it holds for him requires much more than minimal parallel compensation. Deliberate extra attractions ought to be included in the package, attractions such as employment opportunities, consumer goods outlets as well as educational, health and entertainment facilities.

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THE RELATIONSHIP BETWEEN ENVIRONMENTAL CONCERN AND SOCIO-ECONOMIC STRUCTURE

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After the beginning of the environmental degradation over the world, more than thirty years, social psychologists have studied on the factors leading to the generation of environmental concern in the human being by exploring “general attitudes about environmental issues”. In 1990s, the concept of environmental attitudes was accepted the major value of environmental concern for human beings. According to this approach, three kinds of environmental attitudes are the result of the set of values of a person such as Egoistic, Social – altruistic and Biocentric. Environmental concern has been also generally associated with socio-economic and demographic variables such as age, education, gender, income, and residence. In this study, the aim is to investigate both the socio-economic structure of the people living in Küçükçekmece Basin and to conclude the relationship between socio-economic structure and environmental effects of the people by considering their environmental concern.

1. Introduction

In the last century, while scientists have concluded the reasons of increasing environmental problems and been surging appropriate solutions to prevent anthropogenic effects to environment, social psychologists have investigated “general attitudes about environmental issues” (Schultz P.W., and Zelezny L., 1999) and they measured “an individual’s degree of concern for human caused environmental problems” through a variety of scales developed by Weigel and Weigel (1978), Lounsbury and Tornatzky (1977), Maloney and Ward (1973), Maloney *et al.* (1975), and Dunlap and Van Liere (1978) (Schultz P.W., 2001). In this approach, the values were investigated as the basis for environmental attitudes and a *value basis theory for environmental concern* was developed by Stern and Dietz (Schultz P. W., 2001). According to this theory, three kinds of environmental attitudes are the result of the set of values of a person: Egoistic, Social – altruistic and Biocentric. These attitudes are accepted as the basis for environmental concern (Snelgar, R. S., in press) and are also known three distinct bases as the individual, all people, and all living things (Schultz P.W., Zelezny L., 1999). Environmental concern has generally been associated with socio-economic and demographic variables such as age, education, gender, income, residence, and political ideology of respondents.

Different scientists have established the relationship between environmental concern and socio-economic and demographic variables with different approaches. While, e.g., Van Liere and Dunlap assert that “the most powerful analyses of the social bases of environmental concern will likely be those which consider both its demographic and cognitive determinants”; Messick and Brewer tell that integrate solutions derived from individual psychological processes and from structural, or external, factors such as socio-economic characteristics is a need for the researchers studying in this field (Clark C. F. *et al.* 2003).



Target of this study is to investigate both the socio-economic structure of the people living in a certain area and the relationship between this structure and environmental effects of the same people on that area.

For such a study, Küçükçekmece Basin has been selected. Küçükçekmece Lake, which gives its name to the basin, is one of the most important water resources in Istanbul because both it is a natural lagoon system and especially in the past, it included a high number of different species. However; today, Küçükçekmece Lake is a highly polluted water resource because of several reasons such as rapid industrialization, high rate of population increase, unplanned settlement, keeping the region from the basin protection area for a certain period of time, the filling up the Lake and the construction of Sazlıdere Dam (Ağcıoğlu B., Ustün B, 2003).

On the one hand Küçükçekmece Lake is a very important natural resource, on the other hand it is under a serious environmental impact coming from the people living and/or working there. Today, in the basin, it is possible to see the results of the environmental effects of the local people. As a consequence of these situations, Küçükçekmece Basin has been seen as a suitable choice for such a study.

2. The Relationship between Environmental Concern and Basic Socio-Economic Variables

2.1. Education:

Environmental concern and education are positively associated with each other (Marquart-Pyatt S. T. 2005; Gökşen F. *et al.* 2001; Furman A. 1998; Dietz T. *et al.* 1998). The impact of education on environmental concern can be explained by either direct or indirect developments which are seen in the human being during education process.

As it was explained by Guber in previous years, when the level of education raises, the cognitive skills increase and people have a higher level of awareness of public affairs. This situation improves their ability to comprehend complex environmental problems. With education, people can come into contact with other individual's who have different values, opinions and worldviews and become more open to new ideas and value systems. Such an improvement makes easier the acceptance of environmentalism for these people (Yılmaz S. *et al.* 2006).

Educated people can convert their concern for the environment into useful action for the environmental protection. Their existence is important for generation of powerful support for environmentalism (Marquart-Pyatt S. T. 2005).

2.2. Income:

Environmental concern is positively associated with income. Higher income provides the suitable conditions to meet basic needs in human life such as adequate nutrition or health care (Yılmaz S. *et al.* 2006). For lower income people, it is less likely to be concerned with environmental issues since their priority is more likely to meet the material needs of their own or families (Marquart-Pyatt S. T. 2005).



2.3. Age:

Age is accepted as the strongest and most consistent predictor of environmentalism (Dietz T. et al 1998). There is negative relationship between age and environmental concern. For the solution of the existing environmental problems, it is generally needed some comprehensive changes in the structure of the society. For older people, it is not easy to accept so deep changes. However, young people are not integrated into the existing system as much as older people and they are much more open to new ideas and values. That's why, they respond more favorably when confronted with new issues such as in the field of environmental protection (Yılmaz S., et al 2006).

2.4. Gender:

There was no a certain idea about who has stronger environmental concern: men or women for long years. Sometimes there appear some gender differences in environmental issues; these have not been consistent (Marquart-Pyatt S. T. 2005).

Since men have had education opportunities and they have become active in social life for longer years when compared to women, it is expected that men have stronger environmental concern than women. However, as a result of becoming longer years in economic life and father effect, the economical aspects of raising children are much more important for men than protection of the environment. But for women, the solution of environmental problems which generate conditions threatening the health and safety of their families has always been more important than materialistic gains. In addition to this, as a result of having higher level of social responsibility, women can be accepted as the side which has stronger environmental concern than men (Yılmaz S., et al 2006).

3. The Methodology:

Since Küçükçekmece Basin is a very large area covering 26 neighborhoods, 6 pilot neighborhoods, Kanarya, Altınşehir, Güvercintepe, Tahtakale, Başbakanlık Toplu Konutları, Halkalı, were chosen after the evaluations of the information based on interviews made with the muhtars of all neighborhoods. During the selection, it was paid attention to the representation of the complex structure of the general population in the basin by the people in the selected neighborhoods in terms of the place where they come, their economic structure, education level, or population level. Additionally, environmental and infrastructural problems in the neighborhoods were assessed and it was accepted that these neighborhoods are capable of showing the hard living conditions in the basin.

The socio-economic structure and environmental effects of local people in the neighborhoods were investigated through two kinds of method of interview. With a general approach, local people can be accepted as the group of people consisting of the residents living and/or working there and the people who work in either industrial facilities or governmental or official institutions in the basin. In this study, interviews were made with just residents living there.



In the first method, “face to face interviews” were made with the local people. The questions about their education, the city where they come from, the definition of the environment in their minds and the identification of the environmental problems in the neighborhood where they live, were asked.

In the second method, the questionnaires were reached to the parents through the students in the primary and high schools. The questions about their education levels, income levels, reasons for and time of coming to Istanbul, reasons for choosing Küçükçekmece Basin for settlement and the definition of environment, the environmental problems in their neighborhoods, the reasons of these problems and the responsible parts for the generation and prevention of the pollution in their opinion and their views about Küçükçekmece Lake were asked in detail.

With these two methods, totally, 1100 people were interviewed and the information about both their socio-economic conditions and their approaches to the environment were obtained.

4. Evaluation of the Results of the Interviews:

As it is seen in Figure 1, the number of the female interviewees is highly lower than the number of the male interviewees. This situation can be based on both the existence of much more male in the streets and stronger communication ability of males when compared the females in the selected neighborhoods.

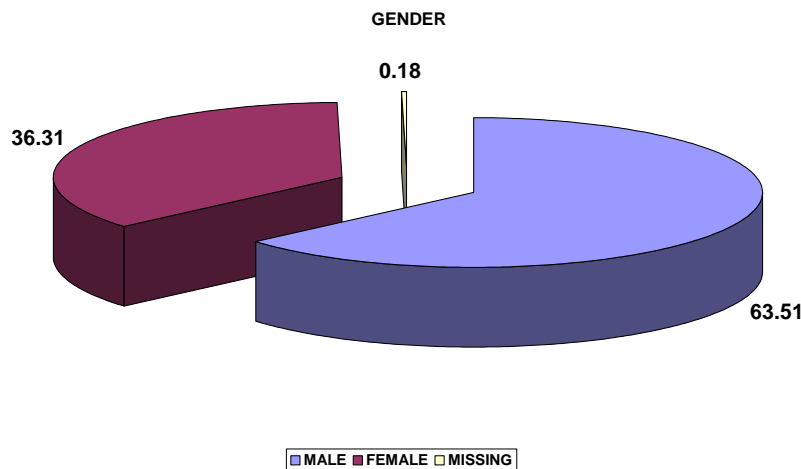


Figure 1. Gender distribution between interviewees

According to the responses to the questions on environmental issues, it has been understood that the both male and female are at the same level of knowledge and concern. The more active and social life of men and the higher sensitivity of women are the factors leading to this situation. Although most of the women in the basin have low level of education and do not work in anywhere, they have showed the correct items as the environmental pollution and its causes in their neighborhoods. The number of the women who were able to indicate unplanned urbanization and the pollution load coming from the factories in the basin as the reason of pollution, is very high. Such correct responses of the women, although they are uneducated and out of social life when compared to men, can be seen as a result of their sensitivity.

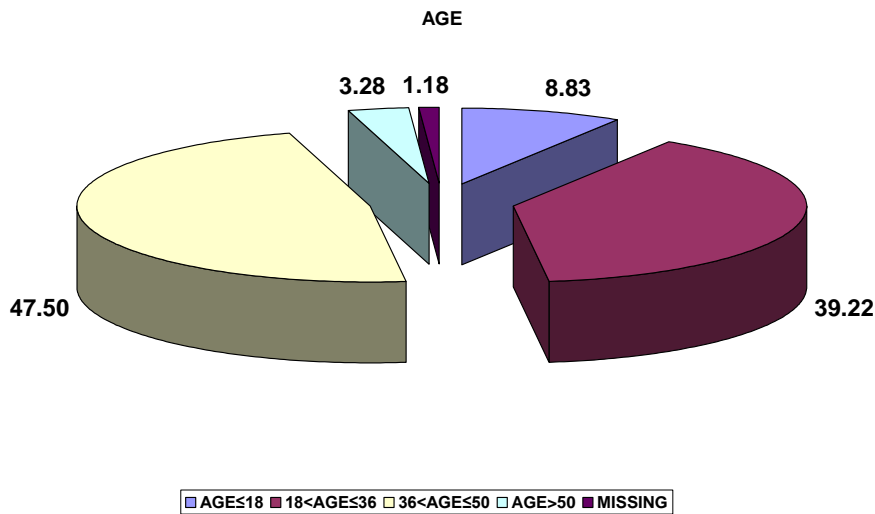


Figure 2. The age distribution of residents in the selected neighborhoods

Figure 2 shows the age distribution of residents in the selected neighborhoods. The number of people has been increasing up to age of 50 (as a relative amount of 3.28); there is almost no one whose age is above 50 in all selected neighborhoods. While in Kanarya and Güvercintepe, most of the people are between age of 18 – 36 (as a relative amount of 39.22), in Altınşehir and Tahtakale, most of the people are between ages of 18 – 50 (as a relative amount of 47.50). During the interviews in weekdays, since most of the middle aged men are at work, the old people, middle aged women and young people formed the interviewees. As it is said in previous part, there is negative relationship between age and environmental concern. The interviews in this study have indicated that young population is much more interested in and affected from the environmental problems much such as increasing buildings and decreasing green areas.

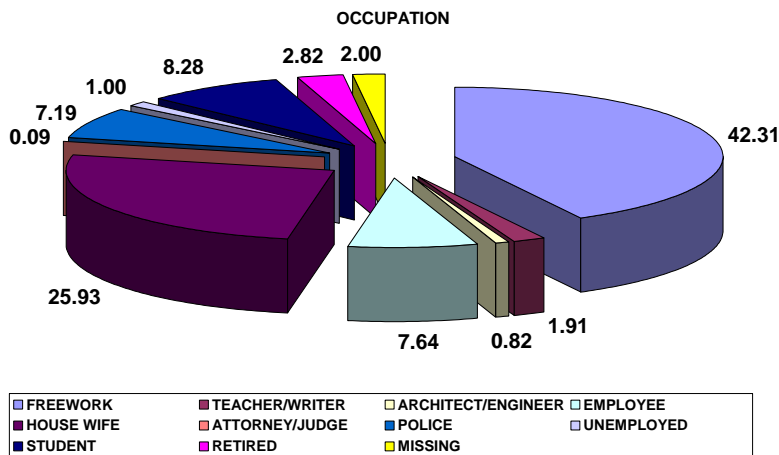


Figure 3. Occupation distributions between interviewees



Most of the interviewees in this study are in the group of free work. Employees and house wives form other two important groups of occupation in the selected areas (Figure 3). In this study, the speaking style of interviewees, while responding the questions, is an important factor in the evaluation of environmental concern. The people respond the questions in an understandable and clear way, and explain briefly several dimensions of the issue in their responses, are from a higher level of occupation group. They have also proposed some solutions to the problems in the basin in their own words. The occupation of the people is accepted as related to their education and income. As it is concluded before, these two items have positive relationship with environmental concern. Such a relationship among occupation, education-income, and environmental concern can be used to explain the higher level of environmental concern based on occupation.

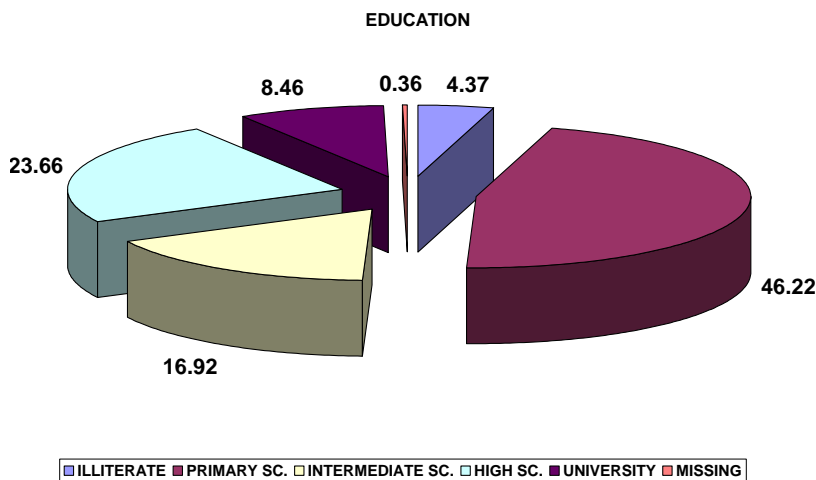


Figure 4. Education distributions between interviewees

The highest level of education in the selected six neighborhoods has been determined in Başbakanlık Toplu Konutları where the people, graduated university, also exist. Halkalı is another neighborhood which has high level of educated people graduated high school. In the other four neighborhoods, most of the people have graduated from primary school (Figure 4). It is possible to see the difference in the way of thinking of the people about the environmental problems and pollution in their neighborhoods. While low level of educated people generally have just showed the garbage in their close surrounding as definition of environmental pollution or problem in the neighborhood, university graduated people could be able to show unplanned urbanization and industrialization as environmental problems in their neighborhoods. They have also drawn attention to the municipalities and lack of inspections as the reasons of these situations.

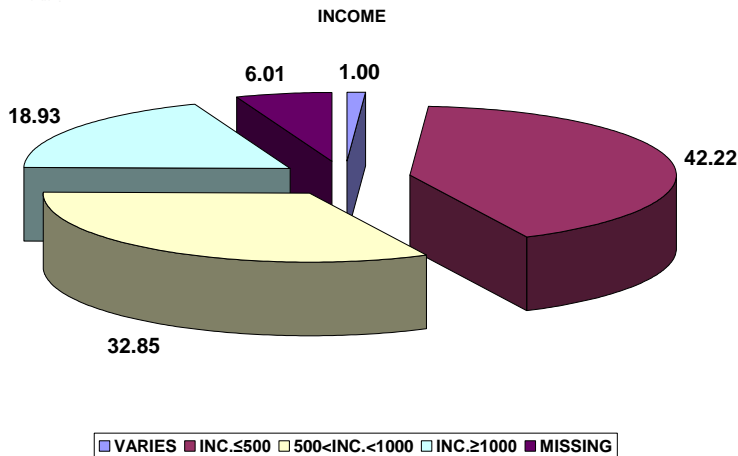


Figure 5. Income distributions between interviewees

Income is another item which has positively associated with environmental concern. The interviews also showed that the scarcity of income directly affects the environmental concern of the people. The low level income leads to priorities in the lives of the people, different from environmental issues. While the people try to survive just by meeting their basic needs, they can not be aware of their own environmental impacts (Figure 5). All these situations have been confirmed by the responses of the interviewees. Additionally, in some cases, they expressed that they are aware of their environmental effects but they claim that the living conditions make difficult to act in a different way. For example, especially in Tahtakale, the dresses are fired for heating and this situation causes a serious level of air pollution. In their opinion, this case is a natural result of poor living conditions in their neighborhood. On the contrary, people with higher level of income are distant from some fears on survival and they care the environment much more than the people who have low level of income. The responses, given by the people who have high level of income, also show that these people can much more accurately analyze the misapplications and their effects in their neighborhood.

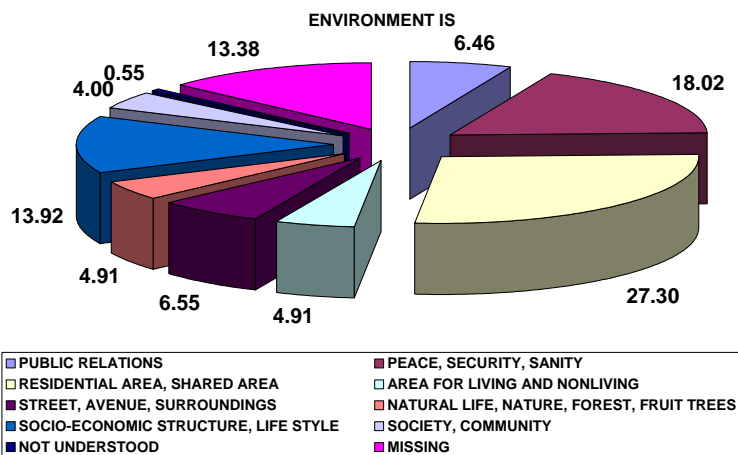


Figure 6 Definitions of environment



During the interviews, the interviewers have given very interesting definitions for environment such as residential area/shared area, peace/security or public relations (Figure 6). These items are generally in the responses of the people with low level of education. The people who have used nature/natural life or socio-economic structure in the definition of environment have generally high level of education. Such a different approach to the environment among the people, from different education levels, shows the impact of the education on the environmental awareness and concern of the people.

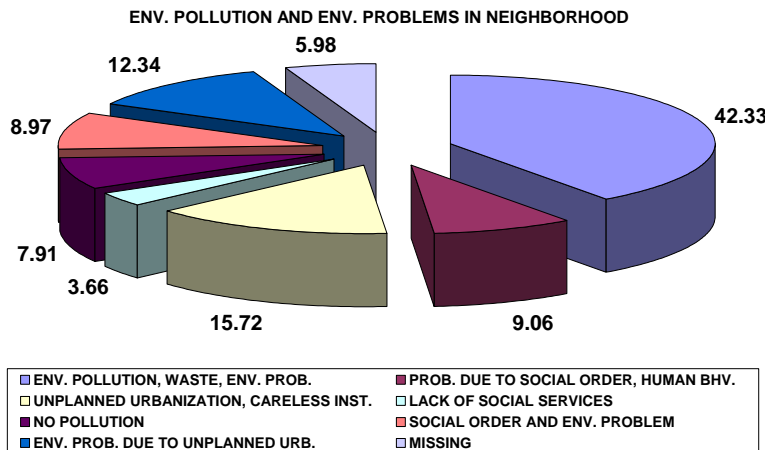


Figure 7. Definition of environmental pollution and problems

The question on environmental problems and pollution in the selected neighborhoods is important for understanding whether the local public is aware of the environmental problems in their neighborhoods. Additionally, this question has helped find out the other problems of local public in the region. Environmental pollution covering air or water; wastes and unplanned urbanization are the items, given by a large group of people (Figure 7). When the responses given this question have been evaluated, it has been seen that there is no great difference among the education, income or occupation of the interviewees of this question. The interviewees have generally given the items which affecting their life directly, are felt by their five senses and existing their surrounding. If it is considered that a part of these people have also defined the environment as their resident area or shared area, the definition of environmental problems with the factors in their surrounding is not very surprising.

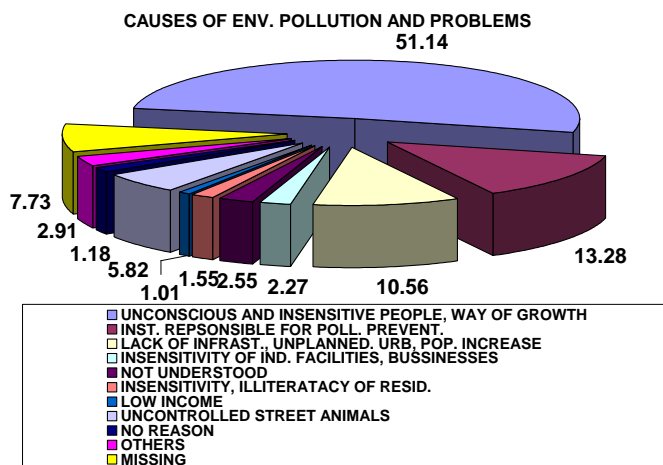


Figure 8. Results of given answers related to causes of the environmental problems and pollution



Most of the people have showed the existence of people and their insensitivity as the causes of the environmental problems and pollution. If the interviewee accepts himself as one of these people, it means that he/she accepts his contribution to the generation of pollution. Such an approach can be regarded as a sign of high level of environmental concern. However, if the person means just the other people apart from himself with such a definition, such a response can not be very realistic and objective approach. Such a person prefers to blame the other people rather than investigating his own share in the generation of environmental problems. According to responses given above, the people who see lack of infrastructures, unplanned urbanization or insensitive applications in the factories as the causes of environmental problems show the much more realistic approach than the other interviewees and their environmental concern can be accepted as higher than the others (Figure 8).

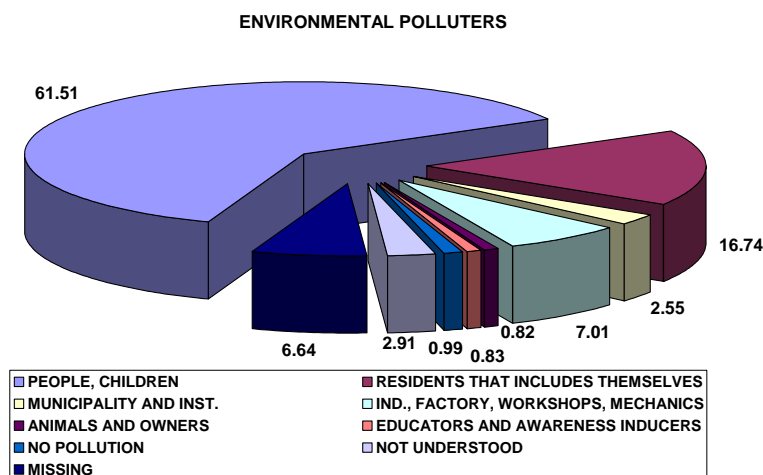


Figure 9. Indicators of environmental pollution as a result of given answers

Indicating correct items as polluter in the neighborhood can be accepted as a sign of high level of environmental concern. The decisions and applications of people lead to environmental pollution. With this approach, the first item, people, can be accepted as correct answer. However, as it has been discussed in the previous question, if the person, indicating this item, means the people other than himself, this can not be seen as a realistic approach and it is not correct to see such an approach as a sign of high level of environmental concern. However, the answers showing industry or factory are very suitable to the conditions in the basin. When the level of education of the interviewees are analyzed, it has been seen that, while the people who give factories as polluters, have high level of education; the people who give animals as polluters, have low level of income.



5. Discussion:

The level of environmental concern has been determined by some socio – economic factors such as age, education or income. In addition to the determining the level of education, or income, it is possible to get an idea about the level of environmental concern of the people by assessing their approaches to the environment, environmental problems, accuracy of the sources of pollution in their opinion or the role which is accepted by themselves as a participant to the generation or prevention of the pollution.

The lives of females in the neighborhood are spent in much more limited area when compared to the men. However, the accuracy of their responds is not less than the responds of the men as a result of high level of woman sensitivity.

In age distribution, Halkalı and Başbakanlık Toplu Konutları, Kanarya and Güvercintepe, and Altınşehir and Tahtakale have similarities with the general age level of their residents. According to the responds, young people are seen as much more concerned with environmental issues in their neighborhoods when compared to older people.

In the evaluation of effect of occupation on environmental concern in the selected neighborhoods, the high level of occupation people have showed higher level of environmental concern with their responses. This situation can be based on the characteristics of people from high level of occupation such as better education level or higher income which has positively associated with environmental concern.

When the responses of local people in the selected neighborhoods are evaluated by considering their education level, it has been clearly seen that the people with high level of education level are much more concerned with environmental issues when compared the others. They not only identify the situations in their neighborhoods much more correctly but also propose solution methods for improving the existing conditions.

Income is one of the items, positively associated with environmental concern. During the interviews in the selected neighborhoods, it has also been seen that people who have low level of income, have different priorities from protection of the environment such as adequate nutrition. They either do not aware of the negative effects of their action in their neighborhoods or do not emphasize the environmental deterioration, seen due to their actions. On the contrary, people who have high level of income are aware of the poor environmental conditions in their neighborhoods and they are capable of analyzing the situation with the causes and effects by considering their contribution.

During the interviews, the interviewees have given very interesting definitions for environment. Actually, some of them are very distant from the definition of the environment in environmental sciences such as residential area/shared area, peace/security or public relations. If the accuracy of the definition of the environment is a sign for the level of environmental concern of these people, it is not possible to mention a high level of environmental concern for these people. On the other hand, since the education level of the people using these terms in the definition of the environment, is low, such a respond can be accepted as important to see the effects of the education on the environmental concern of the people. On the other hand, these terms show that environment, for most of the interviewees, is the place where they live and share with the people in their surrounding.



This is an important result to see the borders of the environment in the minds of these people. As a result of the perceiving environment as proportional with their own life, all assessments about the environment can be made by putting their own lives in the center of the discussion by these people. Naturally, such an approach may not permit to act by considering all living and nonliving species, forming the environment, in actual meaning. Under these conditions, it is not easy to see high level of environmental concern in the lives of these people.

The environmental problems in the selected neighborhoods are generally defined by the local people as the items which affecting their life directly, are felt by their five senses and existing their surrounding. It is a very parallel approach, seen in the definition of the environment. If it is considered that a part of these people have also defined the environment as their resident area or shared area, the definition of environmental problems with the factors in their surrounding is not very surprising. However, some people give the factors like unplanned urbanization, irresponsible institutions or lack of social services by focusing the out of the borders of their personal lives. When it is assessed, it has been seen that, these people have better socio-economic conditions and environmental concern than the others.

Indicating the factors such as lack of infrastructure, unplanned urbanization or population increase as the causes of environmental pollution and problems can be accepted. Such a respond shows a certain level of environmental concern. Although these items have been used by the some interviewees in the selected neighborhoods, most of them have showed the insensitive people as the causes of the environmental problems in their neighborhoods. When it is thought that the factors which have been given in the previous sentence, have been seen as a result of decisions and actions of the people; the response of the interviewees as “insensitivity of people” may not be incorrect. However, such a response is a weak approach to the causes of environmental problems in terms of environmental concern.

Indicating the people as polluter, can be an important approach when the environmental results of the actions and decisions of the human beings are considered. However, there is a significant separation between the both responses covering the concept of people. In the first one, interviewees have preferred to use a general concept such as people. In such an approach, it is not clear to understand whether the interviewee see himself as a polluter. In the second one, they use the concept of resident. With such a term, they express that they also see themselves as one of the sides as polluter. After the second approach, it is possible to make an interpretation about the environmental concern of the interviewees using the concept of people. Environmental concerns of the interviewees, who give respondent as the polluter, can be accepted as much more higher than the others. Additionally, it has been seen that, factories and animals are the concepts given as polluters. The environmental concerns of the people, indicating the factory, are much higher than the environmental concern of the people telling animals. This situation is also confirmed when their education levels are compared.



6. Conclusion:

As a result, Küçükçekmece Basin is a big region where a wide variety of group of people from different education, income and age groups live together. The responses of the interviewees in 6 selected neighborhoods have shown that the education and income levels of these people are not very high. The affects of the poor living conditions can be seen in the responses, given to the questions related to the environment. For most of these people, environment is their surrounding, environmental problems are the things which affect their lives directly and the reasons of these problems are the people. As it is seen, their relationship with the environment is very limited. It can not be said that these people have high level of environmental concern based on environmental conscious and awareness. Their environmental concern is based on the impacts of the environmental conditions on their lives.

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IMPACT OF NATURAL FACTORS ON THE PSYCHO-SOCIAL RELATIONSHIPS

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A cause for investigation of the social relationships influenced from the natural factors was the psycho-social situation which is reflected the recent years in the Tetova district, respectively in the “Gjermo” village and the wider area by the “Poroj” river.

As a result of a many years of active action of the “Poroj” river, characterized with a very steep slope and very active during the high water levels by transporting aluvions with considerable dimensions (thus inducing severe damages outside its river-bed), it has induced different neurosis to the “Gjermo” inhabitants.

In order to understand the social interrelations, sometimes it is necessary to be studied the processes occurring without the presence of the interrelator. Many social psychologist are driven from different sociological knowledge such as: perception, judgement, memory and the different factors causing changes in social behaviour.

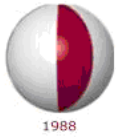
We, as individuals, react differently in situations with different physical phenomena's such as in different places, in noisiness, temperature, floods, earth slidings etc.

In this paper will be treated the human psycho-social aspect and the different natural factors imposing the alternations of human reasoning, feelings and attitude.

Introduction

In the present dynamic of living, lots of phenomenon are hidden, which, perhaps without our conscience, give a direction to the way of our lives. It's questioned, why in the end of lots of experiments is ascertained that the origin of a lot of illnesses wait on psychic traumas that people experience in every day life.

The reason of investigation of personal relations that are influenced form the natural factors, is the situation which a long time is reflected in the suburbs of Tetovo, especially in the village of Gjerma and wider, along the bottom of Poroj's river, as a result of the longevous active motioning of the Poroj's river, which is specified with a very big fall and awful activity during pelting waters which also carries forward a lot of huge alluviums (sediments) and this process of active erosion has caused problems around the bottom of the river initiating slide in big sizes, which slides have caused neurosis to the residents of the village of Gjerma, which is a typical mountainous village.



Geographical description of Tetova

Tetovo is situated in the foot of Sharr Mountain, on the hollow of Pollog. The hollow is surrounded by the Shar Mountain and the Dry Mountain. This typical geographical entirety has a direction of expansion southwest – northeast, with a total length of 55km and wideness of 8-10km. Pollog is separated in two parts: Paramount Pollog with its center Gostivar and the Under Pollog with its center Tetovo.

Tetovo as a settlement is situated in a height of 460 – 500m, and it lies in both sides of river “Shkumbin” (Pena). The river begins in a region of the Sharr Mountain. As a city, Tetovo is extended in a big part of the Pollog hollow and includes some important routes. After the building of the railroad Thessalonica – Skopje – Pristine on 1873 (by Turks), an important function is given to the route Tetovo – Sharr – Prizren, which via Pollog connects the Skopje hollow with the flat of Dugagjin. The third route is automotive via the mountain of Sharr which connects Tetovo with Kosovo.

Important role for the position of Tetovo like a communication center, are the two different economic zones, between which lies the city: the stockbreeding zone in the hillside of the mountain Sharr and the farming zone in the hollow of Pollog. Economic value has the highway named 8th Corridor which connects the cities Durrës – Sofia – Istanbul which percolates in Tetovo. This route is still under construction.

The climate in Tetovo is Hilly–mountainous, Mediterranean and Continental. Has a fever summer, partly humid, cold winter with snow, whereas spring and fall with frequent rainfall. Tetovo has 2.245 hours with sun per year and 122 clear days, mostly on summer.

The height, the nearness of the mountain Sharr, the bottom of the river Shkumbin (Pena), the insolation etc. of Tetovo, determine the air temperature. The average year temperature is 11.6°C.

The natural conditions: climate, relief, the geological forming of the earth, have enabled that in the surroundings of Tetovo begin a lot of sources with flowing water. Therefore, Tetovo is a city that has enough drinking water, water for industrial needs, for irrigation etc.

From the said, Tetovo is an important crossroad and its geostrategical position enables a big economical development.



Physical-geographical and geo-morphological characteristics of the river brza voda (fast water) in gjerma

The river Fast Water begins in the feet of the mountain Sharr with cotes 2.300mm with direction of flowing north - south and in the subjacent part changes its direction south – east towards the villages Gjerma and Poroj.

The length of the river until the village of Gjerma cote 900mm is $L=5.38\text{km}$.

The river Fast Water in the subjacent flow almost has no bottom and in the most cases during the rainfall and the fast debacle overflows the fertile ground and the houses in the villages of Gjerma and Poroj.

During its flow in the village of Gjerma it has a very big fall, which characterizes it with overflows and big erosive potential, so it brings big erosive materials in the subjacent flow especially in the villages of Poroj and Xhepcishte.

Anxiety influence in the thinking process

To be familiar with the social operations, we have to periodically study the processes that happen without the presence of the operatives. Lots of social psychologists withdraw from the social knowledge which includes such mental activities like perception, judgment, memory and other activities that influence in the social behavior.

We operate in situations with different physical characteristics, in different places, under noise, under temperature, in overflows etc. I will treat the psychosocial aspect of the man where I will include the ways or the forms with which people are affected by the natural factors, in their thoughts, their behavior and their feelings.

Stressors are events or environmental forces that threat the existence and well-being of the organism. The environmental stressors directly affect in the nature and the quality of our social relationships. For example when we are in a cold environment or hot one, when there is slide etc. we don't feel good and as a consequence it reflects our personal relations, we get angered, irritated, scared etc.

For this reason we are looking for argumentative ways to explain the events that happen in the mental universe and the spiritual-emotional one, of the personality, which in most cases are manifested as emotional deviation of an inner conflict, which does not terminate with reason but he insists in looking for it in real reasons for himself, but unreal and fancied for others.

Between the most real deviations that are encountered in the individuals of present-day in major or minor size is the phenomenon of anxiety. This psychic occurrence is from day to day more present in our every day life and it has a big influence in all the areas of life.



The laborious life and the insecurity for existence, cause at a lot of individuals' insecurity, fear, which is accompanied with inner dejection over lived and manifested with dusky disquietude, of the nature of a big fear that will happen something very dangerous. This evocation persists longer and it takes disturbing sizes and than it needs psychological treatment and therapy.

The reason of this study is to make a theoretic interpretation of the occurrence of anxiety and the neurosis as a beginner of this phenomenon starting from natural factors that have direct influence.

There will be studied the influence of the anxiety in the rate of thinking, which is a complex psychic process that has special influence in the human behaviors.

About these, two hypotheses are aimed to be confirmed:

- in conditions of high anxiety, the rate of thinking is low
- in conditions of low anxiety, the rate of thinking is high

These hypotheses are based in the existing psychological literature which highlights that in conditions of high anxiety (where the physiological stimulation is higher) the mental activity downgrades.

To certify the purpose of this study and the exposed hypothesis that this treated phenomenon presents an approximate reality and involving it in the villages surrounding Tetovo, are used the inhabitants of the village of Gjerma, Poroj and Tetovo. I'm also aware of the fact that the election of the subjects of study is not leveled in psychic aspect, they are determined by different socio-cultural progresses, also economical and psycho-social one, with different emotional experiences.

As a base for applying of the tests, I have used the hypothesis from which I look for genuineness for the shown conception which is based in:

- high anxiety, the rate of thinking is low
- low anxiety, the rate of thinking is high

To certify, I've used these tests: DTMA (the Degree of Taylor for Manifestation of Anxiety). For the rate of thinking I've used the test of Kvashev named "exchange of letters".

For these researches are tested 100 subjects from all places.

With evolving of the results of the applied tests, I achieved to confirm the hypothesis.



The new age brings to the modern man new problems, new thrills of new forms of human pathology. Living until now in difficult economic conditions, away from the city in relatively quiet environment, the man frequently confronts with new and hard problems. It happens that even though the man lives in good social-economic conditions, he, at the same time fight with basal difficulties, which in psychological aspect characterize the new age in which we live with difficulties concerning the impressions of human relations. The general contests in all the fields of human activities, which manifest anywhere in the world, lead us to two possibilities: “the satisfaction, heartsease, harmony, good feeling or dissatisfaction, sadness, spiritual disquietude” etc. Even the second possibility, at persons who are well harmonized, should affect positively, should stimulate for a new activity, for a big engagement and a chance to “win the game”. At astatic persons, every life failure, every small confrontation, every hopeless wish, in fact is a factor that demobilize, that balks, inhibits or push in “illness”, in confrontation with himself, in confrontation between a lot of small wishes and personal chances, for executing them. That which can not be achieved in normal ways in life, is tried to be achieve in other ways. For example, to formulate in other way with that old attribute of humankind, which the hopeless, the ill ones and the feeble ones complain, that it is paid more attention to them when they live personal problems.

In that way they tergiversate in sickness and they become neurotic. In this way a lot of subjective complains of the neurotic ones are formed which virtually have no organic basis, or they don't have them in the beginning, when the illnesses come across. For these illnesses that don't come across under the impact of factors, like the bacteria are or that are not consequences of toxics, but are consequences of a lot of problems, of ineligible conflicts, interpersonal fights, of incomprehension of dissatisfaction and a lot of other external factors, there is a special term that calls them functional illnesses, with which it is wished to tell that it is not a reflection of organic disorders. Knowing that these illnesses are always in direct connection with any psychic factors (evocation, emotional disquietude), someone calls them psychogenic disorders. Because the disorders of this nature especially are seen at detailed persons who manifest different forms of astaticness of the neurological-autonomic system, except this they are emotionally immature, very emotional or very nervous, so someone calls these disorders with a wider name as neurotic disorders or neurotic reactions.

We have all been in a situation to prove ourselves the genuineness of the prediction that external psychogenic factors can generate disorders in the functioning of any specific organ, which until that moment performed normally, just like it performs after the interruption of that factor. Example: in a situation of not expected fear, the heart starts to beat faster, the legs feel indolence or we have a headache after any disquietude. Today, it is doubtless that psychogenic events can reflect clearly on the rhythm and the way of performing (functioning) of a lot of organs. It should be mentioned that the man is an inseparable psychophysical integral, if the psychics is ill the body will be also and the opposite.

Neuroses are shrink back of that which is normal, but it is too difficult to find common characteristics for all the neuroses. But if we look at the forces that impact in forming of neuroses, there is showed a basic common factor for all neuroses which is called anxiety. Anxiety is a force that makes the neurotic processes to move and keeps them moving.



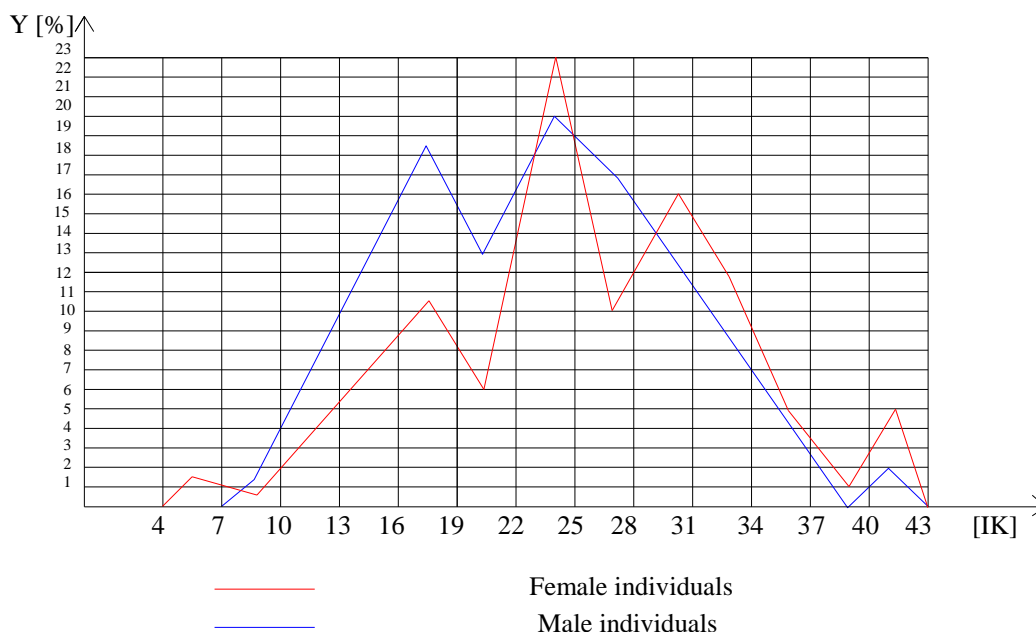
Anxiety constricts the conscience and proportionally with its heaviness, disorders the differentiation of subjective experiences from the objective ones. In anxious condition the individual sorely understands himself, in order with stimulants, so he can not judge them adequately. It can be said that anxiety has two components: psychological and somatic (organic). The psychological component changes from one individual to another one and it is under big influence of the personality of the said individual and his mechanisms for endurance of the problem. The sick individual tries to explain in details somatic manifests and they can be distinguished according to their priority.

Looking at the topic that I determined, I decided to make an experiment that leans in theoretic and practical aspects that are presented in the study. This psychic occurrence that is presented in with the following experiment is a near reality, which includes a number of approximately 300 individuals who live in the villages of Gjerma, Poroj and the city of Tetovo.

Firstly I applied the DTMA test (the Degree of Taylor for Manifestation of Anxiety) with all the applicants (291) and than I applied the test of Kvashev named “exchange of letters” at the same individuals.

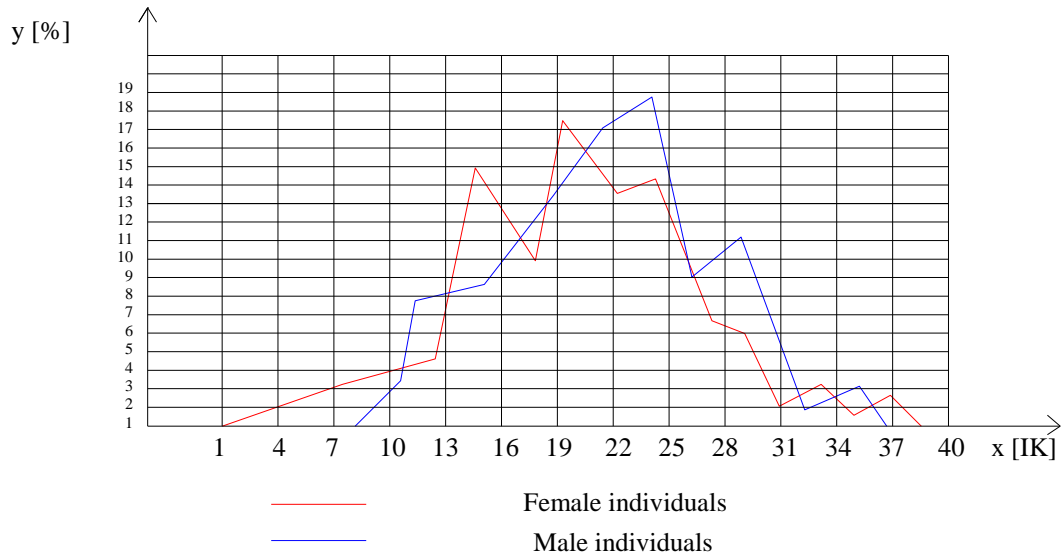
According to the sex, the manifestation of the anxiety at the female individuals has a higher frequency (19.9) meanwhile at the male individuals it is lower (17.1).

DTMA test (the Degree of Taylor for Manifestation of Anxiety) results





Results of the test “exchange of letters”



a) According to this research we conclude that females are more anxious than males

I expound the hypothesis: at the individuals with higher anxiety the rate of thinking is lower and the opposite, at the individuals with lower anxiety, the rate of thinking is higher.

After applying the test “exchange of letters”, which is for the rate of thinking, at the same individuals I observed that the frequency of male individuals is higher (15) than the frequency of female individuals (13.9).

b) According to this research we conclude that the rate of thinking is higher at the males than at the females

I continued with the analysis of the anxiety at the individuals with higher and lower anxiety according to the dimension – rate of thinking, so the individuals that have manifested average anxiety with DTMA, are removed from the further procedure. To prove is there a real difference between persons with high anxiety and those with low one, according to their ability in the rate of thinking, we will look for a connection between these two dimensions and we apply calculation method of χ^2 .

The result is $\chi^2=5.50$



c) We conclude that anxiety is an indicator that affects in the variable ability in the rate of thinking in both groups of the tests.

Because the research is applied in three circumstances we will dab that the manifestation of high anxiety in percentage can be aligned: Gjerma with 30.93%, Poroj with 25% and Tetovo with 10.20%, meanwhile the higher percentage of individuals with lower anxiety is in: Tetovo with 42.86%, Poroj with 23.96% and Gjerma with 17.53%.

In the end we make a comparison of the tested individuals of three paces by the dimension – rate of thinking. Knowing the connection between the anxiety and the rate of thinking, in the way that persons with low anxiety show better results in the rate of thinking, the individuals of Tetovo showed high capability in the rate of thinking with 61.22%, where once again the hypothesis that says that low anxiety conveys higher capability in the rate of thinking is confirmed.

d) We conclude that individuals with low anxiety, have higher rate of thinking and the opposite, individuals with high anxiety, have lower rate of thinking.

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LIGHT POLLUTION

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Light pollution is a global problem. It may be defined as any form of artificial light that shines outside of the area it is intended to illuminate, including light that is directed above the horizontal into the night sky creating skyglow, or which creates a danger by glare, or a nuisance.

As a result light pollution is waste light, which is waste energy which results in waste carbon emissions and money. Street lighting and business floodlighting are the biggest causes of light pollution. It therefore presents a business and the environment issue.

It also results in the loss of views of the night sky and bad lighting can distract road users. Night time lighting has also been linked to cancer in humans. Moreover, wildlife has been affected, and the breeding cycles of birds, moths and insects have been disturbed.

Safety and security may be achieved with energy efficient and well fitted lights, only the light that is needed in the place that it is needed. To date energy saving measures have tended not to deal with artificial lighting. However, the standard house “security” floodlight is 500watts, at a time when the use of low energy light bulbs is being encouraged inside. It has been estimated that the carbon emissions from domestic floodlights in the UK alone is statistically similar to the carbon emissions produced by the average car usage of a town of 114,000 persons. There is therefore a clear energy and development issue. Light pollution is getting worse and increased on average by 23% in the United Kingdom between 1993-2000. The global problem can be seen at: <http://www.inquinamentoluminoso.it/worldatlas/pages/fig1.htm>

This paper will outline the problems above and give examples of the few legislative steps that have been taken to regulate light pollution across the world, and to suggest a positive way forward. The time has come for well thought out national and international legislation.

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Introduction

Light pollution may be defined as any form of artificial light that shines outside of the area it is intended to illuminate, including light that is directed above the horizontal into the night sky creating skyglow, or which creates a danger by glare, or a nuisance. This is generally caused by obtrusive lighting (excessive or badly angled lighting). As a result light pollution is wasted light, which is wasted energy and so wasted carbon emissions from that energy production. The resulting wasteful carbon emissions will be contributing to climate change. Light pollution also very graphically results in the loss of the visibility of the night sky,³⁷ it also adversely affects the health of humans, where it has recently been linked to cancer. Wildlife has been adversely affected, and the lives and breeding cycles of animals including birds, moths and insects have been disrupted. It may also cause a danger to road users by glare caused from lighting shining into roads. Light pollution represents wasted money which adversely affects national economic competitiveness. It is therefore submitted that light pollution poses significant global environmental, ecological, public health and economic problems.

Exterior lighting appears so far to have escaped the levels of regulation currently being employed for many other energy uses. This may be due to the psychological feeling that light is a positive force, akin to cleanliness, safety and security; whilst regulation should be reserved for other energy uses that do not have the same social utilities. Indeed, lighting is usually used for safety and security, so why should it be regulated? The distinction is that the problem comes from poor lighting, not lighting per se. Good lighting can promote safety whilst minimising light pollution. Good lighting is not synonymous with light pollution, bad lighting is. This paper will outline the nature of the problems posed by artificial lighting and how they may be addressed so as to reduce the negative effects whilst retaining the social utility of exterior lighting.

The Carbon Cost of Artificial Lighting

The carbon cost of unnecessary or over-bright lighting is significant. Safety and security may be achieved with energy efficient and well fitted lights, using only the light that is needed in the place that it is needed. The simplistic “brighter the better” mentality is to be discouraged.

There are no official governmental estimates of the cost in either the carbon emissions generated, or in money wasted, by the use of exterior lighting. However, the estimates given below indicate that light pollution may have a larger climate change carbon footprint through wasted energy that may be thought. Perhaps the estimates given here indicate that a detailed international study is needed. Obtrusive lighting may take the form of consumer floodlights, too often believed to improve security. The UK Government’s crime reduction website, however, says the following about the 500watt floodlights commonly used to aid security:

³⁷ See the Cinzano Artificial Night Sky Brightness in the World map for a map of the problem
<http://www.lightpollution.it/dmsp/artbri.html>



“(They) emit a harsh, intrusive and environmentally unfriendly light that is often a serious nuisance to neighbours... Lights where the PIR can be overridden to be switched on permanently can also cause nuisance.

Instantly switch on a powerful white light, resulting in a ‘flash factor’ that disturbs rather than aids human vision. When located near roads, this can be positively dangerous. Equally, badly adjusted and aimed lights can cause dark shadows due to their high intensity light.”³⁸

Obtrusive lighting may also come from public and private sector lighting, including schools and hospitals. It may also escape from commercial premises which are frequently encompassed by a perimeter of bright floodlighting. Car parks are generally floodlit all night long, even when not in use. This may be because it could be thought that there is a greater social need to use floodlighting for safety rather than protecting the environment. Authorities could be accused of saving money incorrectly if they switch off lights at night at the cost of public safety, though simply lighting an area may give a false impression of safety and encourage the public to venture into areas that are otherwise unsafe. Night time lighting may reduce the fear of crime (or even increase it as some nervous people are worried when lights come on, and in the vast majority of cases, this will be because some non-threatening entity e.g. a cat has triggered it). Night time lighting may also increase risk-taking and so not reduce actual crime.³⁹ Indeed, a UK Home Office study did not indicate that floodlighting was a factor considered by dwelling house burglars in the choice of property.⁴⁰

Consumer Floodlighting

To date energy saving measures aimed at consumers have tended not to deal with artificial lighting. It is estimated below that the carbon emissions from domestic floodlights in the UK alone are statistically similar to the carbon emissions produced by the average car usage of a town of 114,000 persons. The Campaign for Dark Skies has a calculator/ comparator, so that the costs in carbon and monetary terms for different types of lights may be compared and contrasted.⁴¹

The following figure is based on the usage of the 500-watt floodlighting in common usage by householders as in many other developed countries. British consumers are being encouraged to fit low energy lighting indoors (i.e. a 20w equivalent to a 100w incandescent bulb),⁴² however, the standard 500watt floodlight is the equivalent of 25 20watt low energy bulbs, and often creates glare and nuisance. The Smalls Lighthouse (a lighthouse off the coast of the UK) has a 35watt bulb by comparison.⁴³ (The highest wattage bulb of the UK lighthouses is the Longstone, on the Farne Islands, with a 1000watt bulb.)

³⁸ UK crime reduction website: <http://www.crimereduction.gov.uk/burglary/burglary45.htm>

³⁹ Guardian Newspaper, 21st November 2003, Bright Lights “do not Deter Criminals”,

⁴⁰ UK Home Office, Decision making by House Burglars: Offender’s Perspectives, (HMSO, London, 2004), <http://www.homeoffice.gov.uk/rds/pdfs04/r249.pdf>

⁴¹ <http://www.britastro.org/dark-skies/calculators.html?60>

⁴² Advice from the UK’s Energy Saving Trust, <http://www.est.org.uk/>

⁴³ BBC Website: <http://news.bbc.co.uk/1/hi/magazine/4734421.stm>



The suggested carbon cost of these lights for the United Kingdom is as follows. It is known that there are 22 million dwellings in the UK, so if one in ten has a 500-watt floodlight, then there will be 2.2 million such lights. The carbon produced by generating 1 kW-hr of electricity varies depending on the production technique. The UK Government's Department of Environment, Food and Rural Affairs (Defra) average figure is 0.43 kg of CO₂ per kWh in the UK; This is a mix of coal, gas, nuclear and renewables. e.g. coal power stations produce 0.9kg/kWh, renewables produce no CO₂ emission,⁴⁴ so this average figure is used.

Most lights are on an infra-red switch, but many activate needlessly when, for example, cats or pedestrians walk by. If an average light is on for half an hour a night, then the national statistic is $(2.2\text{m} \times 500\text{ w}) \times 0.5\text{hr/night} = 550,000\text{ kW-hr/night}$. Per year this must be multiplied by 365 = c. 200m kW-hr/year. If 1 kW-hr produces 0.43kg of carbon dioxide, then some 86m kg/yr of carbon dioxide is produced as a by-product from producing the electricity needed to power domestic floodlights within the United Kingdom.

If a new diesel car produces 150g of carbon dioxide per kilometre travelled,⁴⁵ then one car would have to travel 573 million km to produce the same amount of carbon dioxide as that produced by home floodlights in the UK. Or 57,000 cars would have to travel 10,000 km per year (about the UK national average). This means that the carbon dioxide produced by domestic floodlights alone is statistically similar to that produced by the car usage of a large town of about 110,000 persons.⁴⁶

Public and Private Sector Floodlighting

If the carbon footprint cost of public and private sector lighting is added, the figure will be even higher. Most of these premises leave all their outside lights on all night long for security, even for empty car parks. If there are as many of these lights as consumer lights, and they are on all night (an average of eleven hours a night), then the consumer figure (30 minutes) given above, needs to be multiplied by 22. (2.2m lights, each on for eleven hours a night. 0.43kg of CO₂ per KWhr produced.) The result is statistically similar to the average car usage of 2,500,000 million persons, or c.30% the car usage of London, whose population is c. 7.2million.⁴⁷ (This is 1,892,000,000 kg of CO₂ per annum.)

⁴⁴ Defra, Guidelines for Company Reporting on Greenhouse Gas Emissions,
<http://www.defra.gov.uk/environment/business/envrp/gas/index.htm>

⁴⁵ The Society of Motor Manufacturers and Traders Ltd, Forbes House, Halkin Street, London SW1X 7DS,
<http://www.smmmt.co.uk/co2/co2intro.cfm>

⁴⁶ There were a minimum of 24,808,549 cars in the United Kingdom according to the 2001 census (taken from combining household numbers with one or more than one car), and the population was 58,789,194. So this is means that at least one in 2.4 persons had access to a car in 2001. See also *The Times*, April 18, 2005, which reported estimates of 30.6 million cars in Britain in 2005, with only 26 per cent of all households having no car access. This is a car per 1.9 persons, and this is the figured used for the estimate.

⁴⁷ National Statistics: http://www.statistics.gov.uk/census2001/press_release_1.asp



Street Lighting

Without a doubt street lighting has cut the number of road accidents, and the increase in road accidents during the “blackout” of World War Two, was arguably due to the lack of light. (Although it must also be borne in mind that motorcar headlights were also severely restricted with horizontal slits to prevent upwardly escaping light, and so the lack of streetlights was probably not the only cause.) However, again, the social utility of street lighting must be balanced against the environmental and other costs of night time lighting, so that streets are not over lit and that light is not wasted by being emitted into the night sky.

There are 7.5 Million street lights in the UK, with a mean power of 100W,⁴⁸ that waste an average of 15% of their light above the horizontal. Up to a further 15% of the light is spilt where it is not needed. This amounts to about 131 kW/hr of wasted energy per year per streetlight (using the statistics provided earlier).

Since the average carbon emission is 0.43 kg of CO₂ per kWhr, a single streetlight’s energy consumption equates to c. 57kg per year of CO₂ more than it needs to. Multiply this by the 7.5 Million streetlights in the UK, and a total of 427,500,000,000 kg of CO₂ is produced for the energy wasted by streetlights alone. This is five times the figure for domestic floodlighting given above, and so must be statistically similar to the CO₂ emissions from the average car usage of a city of 550,000 persons.

The energy wasted by street lighting is compounded by the failure of the PFC (power factor capacitor), which regulates the energy consumption of the street light. These capacitors tend to fail after two to three years, and when they do the then unregulated street light can draw up to 50% more energy. As a result, the energy wasted by street lights whose capacitors have failed will be even higher.

The Total Carbon and Energy Cost for Exterior Lighting

The sum of adding the CO₂ wasted from all of the above forms of lighting in the UK is statistically similar to the car usage of a city of 3.16m people.⁴⁹ This is the close to the population of some of Europe’s capital cities, such as Madrid,⁵⁰ or Berlin⁵¹ and considerably more than Paris.⁵²

The carbon footprint of the total power wasted amounts to 942.5m kg of CO₂.⁵³ Since the mean generating capacity of a power large power station is 1Gwatt (1000 MegaWatts), and the typical running generation rate is 0.5 G Watt this wasted electricity is equivalent to the full output of a power station running at 100% capacity.

⁴⁸ CfDS website: <http://www.britastro.org/dark-skies/environmental.html?40#environmental>

⁴⁹ $(110,000 + 2.5m + 0.55m) = 3.16m$.

⁵⁰ The 2005 figure is 3,155,359, taken from: <http://www.citypopulation.de/Spain-Madrid.html>

⁵¹ The 2003 figure is 3,388,477 taken from: <http://www.citypopulation.de/Deutschland-Berlin.html>

⁵² The 2004 figure is 2,144,700, taken from: <http://www.citypopulation.de/France.html>

⁵³ $(86m + 429m + 427.5m \text{ kg}) = 942.5m \text{ kg CO}_2$.



If this figure is extrapolated globally, artificial lighting must be contributing to climate change, and so warrants some form of meaningful national and international regulation. Moreover, the monetary cost of wasted energy here may be estimated as many millions of Euros in Europe alone.

The Dangers to Human Health

Problems can arise with light shining into bedroom windows at night and indeed, night time lighting has also been linked to cancer in humans.⁵⁴ It would appear that light may cause the same sorts of negative health effects as noise. For example, noise which awakens the complainant may produce the cardio vascular “startle” reaction. This causes the tightening of blood vessels and the release of adrenaline, which in turn may lead to fatigue and headaches. Moreover, noise has long been known to cause other physiological responses in relation to the effects on sleep.⁵⁵ Sleep is quite simply a psychological necessity and a reduction may lead to, inter alia, a loss of concentration, increased irritability and generally reduced efficiency.

It is submitted that the physiological effects caused by lighting may be similar to noise. Admittedly, there are comparatively few studies as yet on the problems caused by lighting, but lights can and do wake people up, as does noise. Moreover, with noise it appears that the subject does not need to be fully awakened to suffer the same negative effects as someone who has been deprived of sleep altogether.⁵⁶ Indeed, the research considered above concerning cancer risks does not restrict itself to lighting that wakes the subject, the risk factor is the level of night-time light entering the bedroom. As a result it is submitted that obtrusive lighting may be negatively affecting people’s quality of life. It is suggested that more research is needed on the negative effects of obtrusive lighting.

The glare from overly bright lighting can cause other problems, for although the iris may contract to cut down the amount of light entering the eye, the scale of the glare from obtrusive lighting can cause momentary blindness and pain. This is particularly an issue for the elderly, as the muscles controlling the iris tend to become less efficient with age.⁵⁷ It is also most relevant to light shining into roads, which may temporarily blind road users. It also makes a nonsense of the 500watt lights commonly used by consumers for security which are usually angled outwards, blinding any possible observer of a break-in. The CfDS website highlights the effects of angling floodlighting so as not to cause glare and light pollution.⁵⁸

⁵⁴ See in particular Blask et al., “Melatonin-depleted blood from premenopausal women exposed to light at night stimulates growth of human breast cancer xenografts in nude rats”, *Cancer Res.* **2005** Dec 1; 65(23) 11174-84; Blask et al., “Putting cancer to sleep at night: the neuroendocrine/circadian melatonin signal”, **2005** Jul; 27(2): 179–88; “Pauley, Lighting for the human circadian clock: recent research indicates that lighting has become a public health issue” (**2004**) 63 *Medical Hypotheses* 588–596.

⁵⁵ “Effects of Noise on Physiological State, Noise as a Public Health Hazard”, ASHA Report 4, **1969**, pp.89–98. See also Penn, *Noise Control, The Law and Its Enforcement*, 3rd Ed, Shaw & Sons, Glasgow, 2002, pp.10 *et seq.* for an analysis on the effects on sleep.

⁵⁶ See also Penn, *Noise Control, The Law and Its Enforcement*, 3rd Ed, Shaw & Sons, Glasgow, 2002, pp.10 *et seq.* for an analysis on the effects on sleep.

⁵⁷ “Towards Better Practice”, ODPM: www.odpm.gov.uk/index.asp?id=1144838, s.3.2.

⁵⁸ CfDS website: <http://www.britastro.org/dark-skies/floodlights.html?60>



Light at night has also been linked with short sightedness in young children. US scientists found that children under the age of two who left with a night light on were three times more likely to develop short sightedness than those who did not, whilst those who slept with the room light on were five times more likely to be short sighted.⁵⁹ Clearly children who have light entering their windows from floodlighting could also be adversely affected, however the study did not investigate this form of lighting.

Negative Effects on Animals

Obtrusive lighting can cause wider problems for the environment. It may cause both general and specific problems for wildlife.⁶⁰ Many buildings are now floodlit with upwardly facing lights, often all night long. Moreover, skybeams, laser or other concentrated light beams are sometimes used as a means of advertising for businesses. Bats⁶¹ and birds⁶² may become confused by artificial lighting, disrupting breeding cycles.⁶³ With the increasing push for 24 hour cultures, these dangers are also increasing. These animals may become drawn in by artificial light, especially in poor weather.

“Once inside a beam of light, birds are reluctant to fly out of the lighted area into the dark, and often continue to flap around in the beam of light until they drop to the ground with exhaustion. A secondary threat resulting from their aggregation at lighted structures is their increased vulnerability to predation. The difficulty of finding food once trapped in an urban environment may present an additional threat.”

“Confused by artificial lights, blinded by weather, and unable to see glass, birds by the hundreds and even thousands can be injured or killed in one night at one building... One expert estimates that across North America, up to 100 million birds die in collisions each year. Many species that collide frequently are known to be in long-term decline and some are already designated officially as threatened. Compared to habitat loss, pollution, and over-hunting, the issue of building collisions is neither well-known nor adequately understood. Yet across North America, more birds die from collisions each year than succumbed to the Exxon Valdez oil spill.”⁶⁴

⁵⁹ BBC website 12th May 1999, Health: Night Light Damages Children's Eyes:
<http://news.bbc.co.uk/1/hi/health/342256.stm>

⁶⁰ Rich and Longcore (eds), *Ecological Consequences of Artificial Night Lighting*, (Island Press, 1718 Connecticut Avenue, N.W., Suite 300, Washington, D.C. 20009-1148. USA; 2006)
<http://www.urbanwildlands.org/ecanlbook.html>

⁶¹ The Bat Conservation Trust, Unit 2, 15 Cloisters House, 8 Battersea Park Road, London SW8 4BG. United Kingdom. Threats to Bats, http://www.bats.org.uk/helpline/helpline_threats_lighting.asp

⁶² Fatal Light Awareness Program (FLAP), Royal Bank Plaza, Lower Concourse, P.O. Box 20, Toronto, Ontario, M5J 2J1, Canada. <http://www.flap.org/>

⁶³ See Taylor, “And God Divided the Light From the Darkness: Has Humanity Mixed Them Up Again?” (1997) 9(1) *Environmental Law & Management* 32 at 33 and “Lights out Policy in Cities Saves Birds”, CNN website: www.cnn.com/2004/TECH/science/06/11/life.birds.reut/index.html; the 2003 Canadian “Ecology of the Night” Symposium, which was organised by the Muskoka Heritage Foundation, was devoted to addressing the negative effects of night time lighting on animals. See www.muskokaheritage.org/ecology-night/ See also the CfDS website: <http://www.britastro.org/dark-skies/wildlife.html?4O#animals>

⁶⁴ FLAP, <http://www.flap.org/new/nocturn.htm>



The knock on effects of carbon emissions consequent on excessive power generation needed to supply light are that animals, which would not otherwise be thought to suffer the consequences of light pollution, are adversely affected. For example, "Marine species are under threat from rising levels of acidity in the oceans, says the UK's Royal Society. Unless carbon dioxide emissions are cut, there could be irreversible damage to ecosystems, it warns... Failure to do so may mean that there is no place in the oceans of the future for many of the species and ecosystems that we know today."⁶⁵

Insects may also be adversely affected. Many may simply fly around light sources until they drop of exhaustion, and so fail to maintain their numbers by not breeding.⁶⁶ This in turn may mean that animals further up the food chain suffer due to a drop in their prey. Glow worms are also threatened by lighting, as well as by changes to habitat and pesticides.⁶⁷

The Night Sky

Astronomers are concerned about sky glow, which is the yellow/orange atmospheric halo that surrounds all cities and towns when viewed from a distance of a few miles. This glow is caused by light escaping upwards from badly angled light fittings illuminating water vapour and other aerosols in the air, obliterating the night sky in the process.

Light pollution is getting worse and increased on average by 23% in the United Kingdom between 1993-2000.⁶⁸ Global imaging shows that the problem is worst in industrialised nations.⁶⁹ In an attempt to combat the problem in the United Kingdom, the Campaign for Dark Skies ("CfDS") was set up in the early 1990s in association with the British Astronomical Association. The Campaign for the Protection of Rural England (CPRE) has also joined in with its "Night Blight" campaign.⁷⁰ The global voice is provided by the US-based International Dark Sky Organisation, which was set up in 1988 and has over 10,000 members.⁷¹ However, it must be said that the problems are most definitely not restricted to the astronomy community. The night time sky is for all to enjoy. The British Astronomical Association conducted a survey in 1991 which found that light pollution reduced the visibility of the night sky for 90 per cent of the population.⁷² The CPRE and the CfDS have now started a public study to see how many stars the public can count in the rectangle of the constellation of Orion. It is anticipated that this study will show that the loss of night sky consequent on light pollution is continuing.⁷³

⁶⁵ BBC Website, Emission cuts 'vital' for oceans, <http://news.bbc.co.uk/1/hi/sci/tech/4633681.stm>

⁶⁶ CfDS website, <http://www.britastro.org/dark-skies/wildlife.html?4O#animals>

⁶⁷ BBC Website, 19th July, 2005, Glow-worm alert for dog walkers, <http://news.bbc.co.uk/1/hi/england/derbyshire/4696505.stm>

⁶⁸ For the image of the United Kingdom, provided by the CPRE, see: www.cpre.org.uk/campaigns/landscape-and-beauty/light-pollution/light-pollution-your-area.htm

⁶⁹ Cinzano, Falchi and Elvidge, The World Atlas of the Artificial Night Sky Brightness: <http://uk.arxiv.org/abs/astro-ph/0108052> and <http://www.inquinamentoluminoso.it/worldatlas/pages/fig1.htm>

⁷⁰ CPRE National Office, 128 Southwark Street, London, SE1 0SW.

<http://www.cpre.org.uk/campaigns/landscape/light-pollution/light-pollution-what-is-the-problem>

⁷¹ Campaign for Dark Skies, <http://www.britastro.org/dark-skies/> International Dark-Sky Association, Inc. 3225 N. First Avenue, Tucson, Arizona 85719-2103 USA, www.darksky.org/

⁷² CfDS Newsletter, Spring 1992, p.2.

⁷³ The Clean Sky Project. BAA Link: <http://britastro.org/baa/content/view/195/171/> CPRE link: <http://www.cpre.org.uk/campaigns/landscape/light-pollution>



Children who might otherwise have chosen careers in astronomy or other science may never have the spark that gets them interested if they never see the night sky.

Conclusion: The Solution to Light Pollution?

The best solution to light pollution appears to be several fold, embracing both legislation and education. Preventative legal regulation may be used to control the installation of lighting at planning stage and secondly sanctions may be imposed for bad lighting actually in place. National governments could lead here and both reduce carbon emissions and set a good example to their populace. This could be supported with education. Energy inefficient forms of lighting (such as 500watt consumer floodlights) could be banned, or made subject to a carbon tax. Consumers and businesses could be educated as to the relative merits and disadvantages of different forms of lighting.

Curfews could be imposed by planners, to attempt to strike a balance between users of lighting and those to whom it causes a nuisance. Sports ground lighting is one such example of lighting where curfews may be suitable, as it must, by its very nature be very bright. There is a very useful public utility in encouraging sport to promote public health. However, some sports such as golf at golf driving ranges do not offer the same health benefits. Indeed, golf driving ranges provide some of the worst forms of light pollution, as by their very nature they aim extremely powerful lights into the night sky to illuminate the golf balls. Not all sports have the same social utility. The floodlighting of historic building is another category where curfews could be appropriate (along with limiting the intensity of the floodlighting used). There seems little justification in floodlighting buildings at 3am, when the vast majority of the population is in bed and unable to see the lighting. Thought might also be given to advancing the time of such curfews in areas where families with young children live to avoid light spillage into children's bedrooms.

There have been a small number of nations, or regions which have adopted their own anti-light pollution laws. Many of these are US State laws which regulate the type of light fittings which may be used.⁷⁴ The Czech Republic became the first nation to draft an anti-light pollution law in the guise of the Clean Air Act 2002. However, the law requires formal commencement rules, which have never happened, and so the law has failed to come into force.

The United Kingdom has made light pollution subject to the criminal law of statutory nuisance, if it is "prejudicial to health or a nuisance".⁷⁵ The UK Governmental body Defra is currently drafting a lighting annex for planning guidance, aiming to provide clear guidance to the local authorities who decide the fate of planning applications, as well as the businesses who apply.⁷⁶

⁷⁴ This data is which is provided by the IDA, links to national laws as provided by local astronomical societies and so may not link to official data:

http://bbs.keyhole.com/ubb/showthreaded.php/Cat/0/Number/587221/an/0/page/1#587221_

⁷⁵ Morgan Taylor & Hughes, *Exterior Lighting as a Statutory Nuisance*, [2005] JPL, 1131- 1144; Morgan Taylor, *Light Pollution and Nuisance: The Enforcement Guidance for Light as a Statutory Nuisance*, [2006] JPL, 1114-1127. However, this law does not apply in Scotland.

⁷⁶ The planned annex is to PPS23 "Planning and Pollution Control", For government data on UK planning laws, see: <http://www.communities.gov.uk/index.asp?id=1503250>



Replacement street lamps (where the light is directed at the ground) will save local authorities money and/or make the streets brighter thus promoting safety. It is for this very reason that the Canadian City of Calgary is in the process of replacing all its current street lighting with more efficient installations, under its EnviroSmart program. The energy saving is estimated at \$1.6 Canadian million, and it is expected that the lights will pay for themselves in six or seven years. The new lighting scheme has led to a 22 per cent reduction in carbon dioxide emissions, and Calgary Police Services have not reported any increase in street crime.⁷⁷

The UK street lighting stock is now being replaced with energy efficient lighting, which is often white light. This is due to the human eye's sensitivity to these wavelengths. The result is that a lower level of lighting may be employed. When this used in conjunction with an electronic ballast which facilitates dimming of the lighting at off peak periods (such as in the very early hours of the morning), this can lead to a saving in energy, and a reduction of any residual light pollution. However, developing nations may not be able to afford the large financial investment, which is largely be funded by private finance initiatives (PFI) in the UK. As a result developing nations may be left with inefficient and polluting street lights.

The European Environment Agency should carry out a study on the environmental impact of light pollution throughout Europe. Clearly there are economic as well as environmental issues surrounding light pollution, so that to continue without change is harmful to the economic competitiveness of Europe. Moreover, Europe could consider imposing energy efficiency obligations on exterior lighting, the same as they have consumer boilers and new build houses with energy efficiency ratings. Modern smaller light sources- even LEDs- can more easily be enclosed and there is no excuse today for spreading light where it is not needed, it's (increasingly) not rocket science to put it where it is needed.

⁷⁷ Private correspondence with Calgary Lighting Department. The wasted light from Calgary is shown at:
<http://content1.calgary.ca/CCA/City+Transportation/Maintaining+Roads/Street+Lights/EnviroSmart+Retrofit/Satellite+Photograph+--+Full+Size.htm>



THE IMPORTANCE OF PHYSICAL ENVIRONMENT IN A CHILD GROWING

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Living in the cities of Turkey which live the passing process from traditional agricultural society to modern industrial society with its own historical, social and structural conditions and has a young population, become harder with each passing days. The way of life brings together place's issues for children. Turkey has a young population as a developing country. It is impossible to imagine ineffectiveness of the 0-14 age group that has the specific ratio on population to architectural design.

The researches on children in Turkey have been performed by social scientists so far. Although the subject is investigated under social, political and psychological aspects, the physical environment is generally neglected. The growing of the children and harmonious with society is effected by not only a social environment but physical environment also. Physical environment of a child is growing upon basic requirements and this concept is related with from residence and to big scale environment (city parks, schools, etc.). The spaces using by children can be divided to four part as residence, the near environment of residence, school and city play space. The living space of the children to transform into reliable environs is the first goal of the designer which creates living spaces for the children.

The main aim of this study is to research of the solution which let the children mental and physical growing get possibility and to determine of the necessity and desire of them. Therefore, the study is started with a question "In the reliable environs for a child, what kind of chance can be ensured and what this environment answer for children?". Firstly, the physical environment which has an active role for growing of children is investigated. It is important to know the growing of the children and to know interaction between children and environment for creating feasible environment. In this study, the importance of physical environment on growing of a child is given and then the basic design principles of a place or residence are determined with the point of view of a child as a user.

Keywords: *Architectural design, Physical environment, Child growing*



1. Introduction

Before planning of child environment, it is needed to recognize his life. The main concept about child growing must be known by every individual and association. To recognize of fast and versatile growing of the child is important in point of understanding of behaviour and getting ready next growing period of time.

To examine of child growing is useful to determine behavior characteristics and ability coming into being in growing term. According to the results of many investigations, it is appear that there are some behavior pattern and common trends in the growing age. Knowing the common characteristics and personal differences determines the tracking way in design for children. Every child is in need of nourishing, sleeping, moving ability and protections from his born. As well as these factors, the main psychological child requirements is love, to be loved, to be own and keep in safe like the other individual. The child satisfies these all requirements in the family. Addition to family media, these requirements should be supplied around the residence and schools.

In this study, the solution let the children mental and physical growing will be investigated and also will be determined the requirements and demands of a child in nearby place. Moreover, the physical environment which has an active role for growing of children will be given and the main rules on design criteria will be determined.

2. Child And Child Growing

To know the interaction between the different spaces and the growing characteristics of a child is give some benefit. Since the foundation of the children's behaviors is various and different, we can think the causes of the behavior of the child and can orient him according to the growing properties with better and righter. The growing of a child effects the later ages of him is laid a foundation in the primary years. The growing must be deal with as a whole. Even though the growing areas are investigated separately, the interaction between these areas must not be keep distant. The child growing is based on two factors. These basic factors are environment and heritage. Moreover, the egotism concept which occurs by interaction environment with heredity is the third factor effecting the later term of growing. Knowing the growing properties of the child and interaction with the different spaces are provided us important benefits. It is known that the most important role being added as a family member of a child is in residence and near neighbor's after the family habitat. For this reason, the most suitable physical environment must be offered and suggested to the children.



2.1. Growing periods

The growing periods can not be divided with the certain boundaries. The characters of before period continue later periods. The feature which appears in the first age is added to the later age's characteristics and these behaviors are appropriated. The negativity in the first ages effaces the later ages growing pattern. The growing of a child can be divided as infancy period (0-2 years) pre- school period (3-6 years), primary school period (7-12 years) [1].

2.2. Infancy period

The infancy period importance is huge in respect of child growing and education. The whole foundation about the growing is putting in this period. In this period, even though basic requirement of the child is bare, in case of not covering this there will be some difficulties can not be dissipated later. Therefore, in this stage, the correct education must be given to the child and supplied the suitable place has great importance. The baby born as a weak person turns a living being that can use his arms and legs and also walk in the first year. That is why; this stage has also importance in spiritual growing as well as physical growing. Unfortunately, Only nutrition, cleaning and supplying suitable places is not adequate. The child is deeply in need of love, interest and trust [1].

2.3. Pre-school period

The most colorful age of a child is between 3-6 years as called playing period. In this period, the child is talkative, active, lively, gregarious and sweet. The child asks questions continuously, and has endless learning interest. He also wants to recognize and know everything [2]. The all desire of a child about knowing and recognizing everything increases in this stage.

The children come from the safer conditions and balanced home in emotion, has more successful to discover the physical environment. In the 4 years age of a child, he spends some time outside of the house and starts to be aware of the social world. After these ages, the children like social activities and prefer some small shorted time group in playing. In this age, some sharing plays grow [1].

2.4. Primary School Period

Some growing and changes occur during this phase such as infant and pre-school periods.

The mental and social ability of the child grows rapidly in these 7-12 age period. Thinking and learning ability changes [3]. The interaction between the child and family decreases in proportion to previous periods. This shows the child's conscious increase [4]. Primary school period, the child moves from family's socket to outer world. In this stage, child's interest also moves from home to street [3].

School-age's need to interact with others. Acceptance by friends, often to the exclusion of others, is almost everything to them. They often have one or two best friends. School-age children also form groups to distinguish themselves from others. In their attempts to secure a place in a group, children can get boastful, loud, aggressive, argumentative, or take risks. Children who cannot or choose not to behave in these typical ways may become withdrawn.



The necessity of the place for the child who starts to be social person shows some differences according to the later period. The individual child is in need of on his own place. But the child life is never restricted by his room's walls. In this stage, the child wants to relation with the same aged child and adults so as requests to be alone. In this stage that the friend's interaction increases, the child's playing at home extends to park and playing spaces as well streets.

3. Child And Environment

Human being, the other people around him is in some effect like cultural, physical and social factors. As the result of complex entire whole consists of mentioned factors, people appear as individual [5]. The child is an interaction between physical and social environment. For this reason, the effect of the social and physical environment on the child is great.

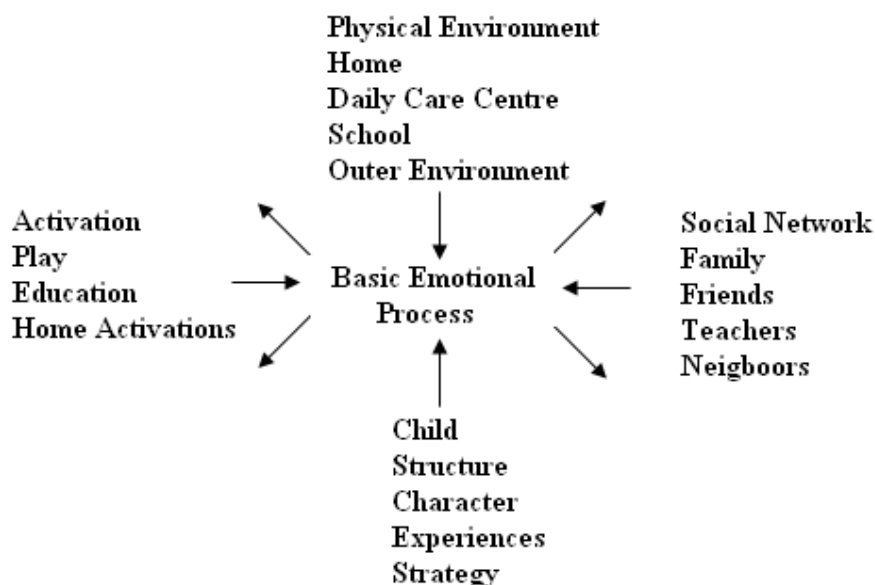


Figure 1. The physical model describing the interaction between child and environment [6].

3.1. Child and its social environment

The social environment of the child consists of family, teachers, friends and neighbors. The researches give that the only obtaining physical requirements of the child is not adequate for making social relations. 6-7 aged child especially tries to set up relations with playing friends. This shows the social motivations and social requirements [7].



3.2. Child and physical environment

In terms of the physical environment, the size and scale of many cities has increased tremendously. Although we do not really know whether or not this in fact makes a difference in the lives of children, and if so at what age, the assumption is that it does make a difference. It would be very interesting to do comparative studies that would investigate this question. Related to this is the fact that rates of car ownership and the number of cars on the roads have also significantly increased, and this clearly has implications for the safety of children and for their ability to use the streets in various ways on their own [8]. This in turn has led to increased air pollution, which is added to the other sources of pollution from industry and so forth [9]. On the other hand, sanitation, health care and educational services have been improving, particularly in cities of the developed world.

The physical environment of the child grows bases on basic requirements. The physical environment is the concept that extends from the residence to big scaled environment of child. The children who are imprisoned, uses the special associations, restricted places and arranged, checked and can divided four parts [10].

Residence, an edifice unit that founded in order to cover the requirements which appears from shared life. The place where the children found his interaction with world is house. In our world residences, the chance does not be given to free behaviour of the children. Since there are some restrictions about noise, dirtying as well as some restriction to preventing some accidents, the child can not behave free [11].

The near around of residence can be described as corridors, apartment entrances, the sidewalks in front of and behind the residences and gardens, street groups. But today, the near around of residence is far from safety outer place to use of children. Whereas these place that have some facility, are the most important and in need, give some playing to the children. The restrictions and hindrances make the children move outer place [10].

School is the environment that the child is apart from his parents and spent his daytime. The school must support the child mental and physical growing. Because of some restriction in the residence and some safety problems in the near around of residence, the school is became the most important place where the child spent his time and desire all wishes and requirements. The results of the whole of these parameters, school is also became a place that give the child more suitable facilities about his [10].

Urban playing places are arranged specially children parks and gardens. Finding natural place in the city grows his interest in nature. The playing place of the children that must be arranged in this urban playing give the children's active plays and make the other plays places [10].



4.1. Evaluation

Socialization of the child gets being a member of the society. The child lives the process of socialization in both social and physical. Some changes have been done in the residence and physical environment where the child lives in because of fast and unplanned urbanizations. Our environment is filled with lot of design which are only for adult requirements. The parks, shopping centers, libraries, museums etc. is not designed for the children.

The using spaces of children in the residence and near around spaces can be divided three parts as experienced problems in inner place, interval place and outer place.

The main problems in the inner place are, lack of playing area for children, non existing child room, using existing children place for different purpose by the other family members, selecting child room as the smallest room according to the other rooms. The child room planning is the most important for healthy family and society.

The lift, stairs, apartment entrance which is described as interval place are used frequently especially in winter months by the children. In this transition places, some physical problems rises because of lack of non-knowing child users. The children who can not use lift by themselves face some problems on the stair ladders heights that have non-fitting dimensions. The existing of the children in the inner place of the apartment disturb to apartment's occupiers.

Especially after 5 year's age, the child spent his time in the outer place (see Table 1). This place is trainer environment. Particularly, there is no different arrangement to supply of children's requirements in the low level residence settlements. The existing playing places are far from the residence blocks. The children wants to close to the residence and in this way they can satisfy some requirements easily. Since most of these playing spaces have vehicle traffic, the children don't be let playing alone in the outer place. There is any outer arrangement where the children play easily in the winter months.

Age Children	Of	City And Building Height		
		Maale Edumim*	Pisgat Ze'ev*	Haifa**
		3-4 Storey Bldgs	3-4 Storey Bldgs	8-16 Storey Bldgs
3-4		58%	22%	0%
5		92%	59%	16%
6-7		96%	75%	74%
8-9		100%	88%	94%
10+		100%	100%	100%

Table 1. Permission to go out alone to play, by age (% within each age group) [12].



4.2. Results

The quality and design of a child's physical environment can cause or prevent illness, disability and injury; therefore a high-quality environment is essential for children to achieve optimal health and development. Some design principles in homes, schools, residential neighborhoods and cities must be applied for children, correctly. All of these spaces affect children achievements.

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THE ENVIRONMENTAL JUSTICE APPROACH AS BASIS FOR POLITICAL SOCIO-ENVIRONMENTAL CHANGE IN IMPLEMENTING SUSTAINABILITY STRATEGIC POLICY

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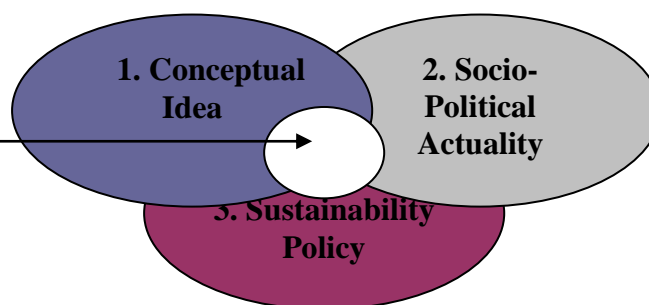
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The Environmental Justice, although emerged at the human rights movement at USA in the 80's(1)⁷⁸, is a newly thematic perception of *environmentalism*, and could be reviewed on three levels of references, in the academic field as well as the public arena:

- a) **As a conceptual idea** which links between the state of environment and social terms (as social justice, distributive justice and procedural justice). The conception of 'Environmental Justice' could be characterised according to few features, including: unequal accessibility to public and natural resources and imbalanced distribution of the environmental pollution burden in geographical space.
- b) **As a socio-political actuality** in which the population who suffering from environmental hazardous, in most cases, is political powerlessness, who excluded from decision making processes.
- c) **As a strategic policy towards sustainability** based on international resolution followed the Brundtland Report⁷⁹, civilian accord platform and environmental justice values.

Adopting such approach, challenges the 'Sustainability' term with socio-environmental political relevancy for the 21st century.

Fig. 1:
Environmental Justice
Approach



¹ See for example the recent published book by Bullard Robert: The Quest for Environmental Justice: Human Rights and the Politics of the Pollution, 2005 Sierra Club Books.

² The World Commission on Environment & Development, Our Common World, 1987.



Preface

Since the beginning of the 90's, an apparent tendency of increased cooperation between what so-called the 'Green Groups' and the organizations for social change (all NGO's) can be detected in Israel. The cooperation is mainly on public campaigns and human rights legislation lobbying, sharing the some vision for sustainable democracy and civil society.

This article is aimed to: 1) give a broad perspective of the contemporary socio-environment state in Israel, based on recent academic research and public reports; 2) Providing platform for formulating performable strategic policy for sustainability.

Perspective of the Socio-Environmental situation in Israel: *In theory and In practice*

Perspective of the Socio-Environmental situation in Israel, as depicted in the recent reports based on work began on 2004 (3)⁸⁰, provides us unique opportunity trailing the three diagnostic stages of the environmental justice, with their inter linkages and mutual influences. The work evidently indicates that many of the environmental problems share a comprehensible social context, stemming, among other things, from policies that are inconsiderate of vulnerable populations, preference of the welfare of few, and neglect exercised by authorities entrusted with law enforcement and the care for public health. The Socio-Environment status in Israel, as reflected in those reports (4)⁸¹, portrays the following features: 1) the debilitated population – similar to research findings elsewhere (5)⁸², in Israel too, the affect of environmental conditions on health is uneven and is related to socio-economic status. Those reports as well as other researches (6)⁸³ show that populations who more exposed to environmental pollution are weaker ones, of various natures: due to status, ethnic and or geographic backgrounds (7)⁸⁴; 2) Lack of accessibility to decision making nodes as well as to basic services and infrastructure that are essential to ensure the health of the population and the availability of medical treatment. These findings are most acute in the periphery; 3) Inherent inequality of the public systems due to governmental decisions. As we learned, environmental threats do not merely result of errors that are corrected as soon as they are noticed, but often are the consequence of economic interests.

³ The Environmental (In) Justice Reports, The Environmental Justice Committee at Life and Environment (www.sviva.net).

The first annual Report (2005) focused on four main fields of: Environment, Society, Economy and Health. The 2nd annual Report (2006) focused on Social justice, population and Health. Edited by C., Lubanov. The Reports were published in Hebrew with executive summary in English translated by S. Porat.

⁴ Detailed in the former remark.

⁵ Selective references are: Girdner, Eddie J., Smith, J., Killing me softly: toxic waste, corporate profit and a struggle for environmental justice, New York: Monthly Review Press, 2002.

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⁶ As quarries and environmental justice, headed by the Galilee Association.

⁷ In Israel, environmental injustice is most acute in the Arab sector, where it is largely unaddressed. Until recently, there has been very limited environmental activity within the Arab sector because the local population tends to identify Israeli environmentalism with Zionism and the exclusion of Arabs from the land.



Reducing pollution emissions to the air and water is costly, therefore the polluter profits at the expense of the general public. Environmental justice challenge is a battle over 'Society and Democracy'.

Among the wide range of conflictual situations are the quarries (both legal and illegal in terms of establishing and operating) producing air pollution affecting Arab settlements in the Galilee; Sewage that not properly attended to in the Development town in the south of Israel (the Negev area); The destruction of nature reserves in the Galilee by sewage pollution flows untreated from the local Arab villages.

The influence of environmental conditions on health is correlated with social status. Disadvantaged groups, on the basis of social status, gender, ethnicity, age or geography, are the principal victims of environmental hazards and their health effects, such as infectious diseases, airway diseases and coronary diseases.

The assembled data of the reports indicate that some populations are in greater danger than others: foetuses, babies, children and teens are more vulnerable to exposure to various toxins. The outcomes include higher mortality rates than normal, primarily as a result of respiratory diseases. Impairment has also been recorded in IQ scores and early stages of child development as a result of parental exposure to pollutants. Other morbidity findings consist of cancer and heart disease.

Another socio-environmental indicator is 'hospitalization rates' in specified geographic areas – based on research let by the North public coalition for Health (8)⁸⁵ in Israel in which air pollution levels are higher, there are higher hospitalization rates, both qualitative and quantitative. Affected populations include Bedouin tribes residing in close proximity to the Ramat Hovav Chemical Industrial Council (South) and residents of the northern region in the vicinity of the Haifa bay, where a great number of industries are concentrated. The commonality is pointing out to the activity of industrial factories as the source of pollution, and the regulations and attitudes of the authorities enabling their detrimental activities.

In theory, it is shown in a work by Adva centre (9)⁸⁶ that the government uses 'stick and carrots' when addressing industries: negative and positive incentives. Neither is being activated appropriately. Economic incentives to develop environmental technologies and motivate existing companies to improve production procedures are insignificant at present. At the same time, enforcement budgets of the Ministry of Environment have been severely decreased since established in 1988, and is absurdly small. If not sanctioned, environmental laws are meaningless to the industry.

⁸ The North Public Coalition for Health (in Israel) assembled more than 20 national and peripheral grassroots assisted by physicians from different disciplines and academic researchers.

⁹ Adva Research policy analysis center (www.adva.org).



Slow and cumbersome proceeding by authorities and the quality of prosecution procedures taken by the Ministry of the Environment, prevents the use of stronger legal means against polluting factories in consideration of the rights of local residents to a healthy environment and a healthy life. Past experience teaches us that such petitions end in compromise, purging industrialists of personal responsibility and accountability, setting relatively minor fines. Prosecution as it is used by the State today is not effective in deterring the principal polluters in Israel.

An example of these environmental in) justice issues presented in the report is the sewage stream channelled from development town in the south (Dimona) through 5 unrecognized Bedouin villages, flowing in and around them en-route to the Beer Sheva river (10)⁸⁷. The vegetation on the banks of the stream is consumed by livestock, in turn becoming part of the residents' traditional home-made diet (as milk, butter and meat). Residents are compelled to walk through the stream in some parts in order to get to the school or accessibility to health centre. The open sewage is a source for pollution, creating foul doors and serving as breeding bed for mosquito colonies. Both the responsible factory and the municipality fail to address the situation and solve the problem. An apparent example of procedural justice is the government policy declared to concentrate the Bedouin Population in a small number of urban settlements under the pretext of promoting their modernization process – regardless of their traditional way of living, as they were not consulted when this policy was planned – also affects the proceedings, in fact depriving residents from elementary municipal services. Attempts by the government to coerce urbanization on the Bedouin have failed. Presently, proper and corrective planning should be introduced, with the involvement of the Bedouins wishing to maintain their rural lifestyle. The Regional Council of Unrecognized Villages demands that all 45 villages currently under the dubious status of 'unrecognized' be endorsed by the State, and Bedouin ownership on their land acknowledged. To date, only 1% of the South District land is in Bedouin ownership, while they represent 27% of the district's population.

A materialized example of distributive justice is the Land- and the allotting of the open public space- which historically been a core issue in the narrative of the State of Israel. Attempts have always been made by stronger groups of Israeli society take over most expendable resource. Unavoidably, this happens at the expense of disadvantaged groups. Unjust division enriches certain populations, critically contributing to the deepening social and economic disparities.

Other aspects of land disparities studied include the distortion in mapping municipal boundaries, resulting in extreme inequality in the definition of areas of high-taxation potential under rural regional councils and urban local authorities. Despite the fact that most of the population –over 90%- is urban, rural regional councils regulate some 80% of the land. These include not merely valuable agricultural lands, but industrial areas affluent with factories, power stations and other heavy taxation potential factors. Thus a town's socio-economic level and its population numbers have an inverted relation to the land size and taxation potential areas under its jurisdiction.

¹⁰ a) Physicians for human rights, at: http://www.phr.org.il/Phr/downloads/dl_155.doc

b) The unrecognized villages in the Negev (RCUV), for example at: <http://www.hic-net.org/document.asp?PID=199>



Mending municipal boundaries can have crucial influence on the entirety of activities in every local authority, beyond the mere economic aspect. This includes environmental qualities relating to the preservation of open spaces and prevention of hazards; planning aspects of residential construction and density; social issues concerning the variety and quality of public services the authority is capable of supplying its residents, as well as inhabitants of the rural vicinity.

The Socio-Economic Perspective: is demonstrated as extreme distributional injustice, not only of spatial nature resources as land. The National Insurance Institute states in its yearly review for 2004 (11)⁸⁸: "... Israel is among the leading countries in terms of poverty dimensions and income disparities." Economic issues greatly affect lives, all the more so over the last couple of years, during which immense economic reforms were hastily executed: rapid implementation of a tax reform, tightening public expenditure, privatization of services and national companies and more. Government policies continuously amplify economic disparities. Economically, socially or politically weakened populations find themselves exposed to environmental hazards with no access to basic natural resources as a result of their social marginalization.

Population growth and intensified density around urban focal points creates a growing demand to building and construction materials. This intensifies the work undertaken by quarries in Israel's Northern District, resulting in severe damage to air quality and dust pollution throughout the quarrying process; excessive noise; damage to groundwater; topographic changes and damage to natural values; all threatening public health. The abovementioned outcomes of mining and quarrying most severely affect the Arab settlements located in close proximity to the quarries (12)⁸⁹.

Structured Paradox:

The significance of public participation is derived from a social-liberal concept, assuming that different groups of society are entitled to full participation in decision-making processes on different issues on the national agenda. The current atmosphere among social and environmental NGO's is that the arena of all citizens' quality of life and health should not to be left entirely in the hands of authorities, those in position of considerable capital, polluters and political pressure groups.

A structured paradox is indicative, according to which there is growing willingness on behalf of the establishment to include individuals in the decision making process which will affect their own futures on the one hand, while on the other, blatant attempts are made to fence in the 'environmental power' accumulated by NGOs.

¹¹ www.gov.il/FirstGov/TopNavEng/Engoffices/EngAuthorities/Engbt1/

¹² Quarries and Environmental Justice in Israel, to be publish soon, by the center for environmental policy - Jerusalem Institute and the Galilee association Shefar'am.



Sustainability and Survival – designing paths to achieve Sustainability Strategy

Following Rio and Johannesburg Summits (1992 and 2002 respectively), the Israeli government was taken a decision that "the government's policy will be based on principles of sustainable policy" (13)⁹⁰. *In practice* the government has no coherence policy, and till now, sustainable development has not been adopted as a national strategy that frames and underlines the actions of the government.

The conceptuality of 'Sustainable Development' is still marginal in the social- discourse (14)⁹¹ as it is in the acting policy of all governmental ministries.

Adopting a strategic policy, based on environmental justice approach, could provide the conceptual reframing for the neglect 'sustainable development' policy and could pose challenge for designing the future.

The conceptualization of Sustainability, based on the socio-environmental judgments, should lead adopt practically the following guidelines:

- The Governments must actively implement is resolution (15)⁹² regarding the adoption of sustainable development policies and drafting strategic plans to be implemented in every ministry and other governmental authorities. The government must assign proper values to environmental-social issues in the evaluation of development plans and when prioritizing, taking into consideration principles of 'inter-generational justice', the 'needs of future generations (16)⁹³ and other long term considerations. The sustainability policies should anchor by the government in the national budget. In the absence of budgetary reference (17)⁹⁴, it is more than doubtful that ministries will actively implement this resolution.
- Creating clear and established mechanisms of public participation in planning decision making processes, broadening the active involvement of populations usually excluded, which might be affected by projects and development.
- Expanding the representation of environmental and social organizations in national and professional committees, and implementing the new law stipulating environmental committees, including representatives of the public, in local authorities.

¹³ Government Resolution No. 246 was taken on the 14th of March 2003.

¹⁴ Contrary to the centrality of the environmental discourse.

¹⁵ In May 2003. The applicability is to other states who formally adopted the sustainable development policy, following Rio summit in 1992 (Agenda 21).

¹⁶ Brundtland Report, 1987.

¹⁷ As it is the case of the 2007 Budget proposal in Israel



- Policy makers should apply the 'Precautionary Principle' (18)⁹⁵ wherever there is scientific uncertainty considering potential threats to human health and the environment. A norm of environmental justice should be applied, according to which the burden of uncertainty is shifted away from sensitive populations, in cases that the absence of sufficing scientific evidence prevents the use of available tools to evaluate environmental and health risks.
- Authorities in the national, regional and local levels must allocate monetary resources required for basic environmental infrastructure, including the allocation and necessary resources to encourage active transportation, contributing to a healthier lifestyle on one hand, and on the other resulting in decreased environmental pollution.

Other recommended steps towards sustainability in view of the environmental justice approach are:

- Determining environmental standards and limits to emission of pollutants (into water and air, radiation etc.) based on the most affected and vulnerable populations (such as children), rather than a theoretic average level.
- Creating organized databases on of environmental and social issues, including the execution of a series of comprehensive epidemiological studies, their analysis and publication to the public.
- Obligating a 'health impact assessment' for projects with a high risk potential for public health, in addition to the environmental impact assessments required today.

¹⁸ Principle 15 in Rio Declaration: "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."



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COMMUNICATION AND EDUCATIONAL APPROACHES AND STRATEGIES FOR FOREST MANAGEMENT: A NIGERIAN PERSPECTIVE

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This paper acknowledges the critical significance of efficient forest management in the on-going global efforts at stabilizing the fragile ecosystems and sustaining the overall enhanced socio-economic and environmental health of society. Social responsibility, agenda-setting, development media and democratic-participant theories provide the theoretical underpinning for the paper. The paper is of the view that tree planting/forest conservation is a group-anchored, culture-bound environmental practice. Thus, drawing richly on Nigerian experience, the paper highlights the potentials and limitations of both exogenous and endogenous media and environmental education in the development of a positive attitude to forest conservation practices. The paper suggests options and strategies for optimizing their possibilities and minimizing their limitations for effective forest conservation practices among largely traditional, predominantly non-literate and heterogeneous rural Nigerian tree planters/forest conservationists.

INTRODUCTION

Forest management is of critical significance in the on-going global efforts at stabilizing the world's fragile ecosystems and sustaining the environmental and socio-economic health of society (Meduna, 1991; Aina, 1991; UNCED, 1992; Chukwuezi, 2002). To underscore this concern, the United Nations Conference on Environment and Development (UNCED), otherwise known as Earth Summit, held in Rio de Janeiro, Brazil in 1992, specifically expressed grave concern for the aggravated and unabating loss of forest resources. The Summit, among other cardinal issues, adopted the Forest Principles and Agenda 21 to redress the hazardous drift into environmental catastrophe. Similar concerns, with relative emphasis on forest conservation, have been expressed at the United Nations Conference of Parties to the Convention on Climate Change, held in Berlin, Kyoto, Buenos Aires, Hague, and Bonn, (Osuntokun, 2002).

The current global concern for sustainable human development (SHD) through conservation of natural resources (of which the forest is chief) is long overdue. This is because forests constitute a critical scarce resource, indeed mankind's life support system, which requires and deserves prudent management if severe dearth of forest products and future ecological disasters of catastrophic proportions are to be averted. Forests, according to Onyewuotu and Okeke (1991: 53), citing King, "are one of the disaster buffers on which mankind depends... a buffer which uses its complex organic structures to withstand adverse environmental perturbations up to a certain threshold". They reasoned that:



Forests ameliorate the climate, protect watershed, prevents (sic) desertification in arid and drought stricken regions. They provide timber, food, (medicine) shelter and fuel wood as well as prevent and control catastrophic environmental disasters like drought, floods and erosion. (parentheses added).

The potentials of forests to serve as life support systems, as highlighted above, may not be realized because of the reckless exploitation of forests through lumbering, clear felling, bush burning and unwholesome agricultural practices, with the resultant consequences of deforestation. Oshuntokun (2002) has however, observed positive steps being taken by developed democracies to stem the tide of deforestation. According to him, the issue of global environmental abuse has assumed both economic and political dimensions, particularly among western democracies where the issue of environment has become a factor in who wins or loses elections. Environment or Green parties are now part of the political scene in most parts of OECD countries. Specifically, in France and Germany, green parties, according to Oshuntokun (2002), are part of the coalition government, and where such parties are not in government, they are influential in the political process in that they determine who wins and loses elections by poaching on votes that would have accrued to other major parties. Unfortunately, developing nations are gravely disadvantaged in the crusade against deforestation by reason of widespread poverty, the rising cost of alternatives to fuel wood, indiscriminate logging for export, or for economic policy of timber-for-debt swap. In Nigeria, however, some definitive steps, which will be highlighted shortly, are being taken to redress environmental blight, resulting from deforestation.

Communication and Forest Management

This section of the paper is premised on the thinking that redressing the current assault on our forests should be the concern not only of forest and environmental experts, but also of communicators and educators. It is the position of the paper that in concert with other inputs, communication and education can help not only in arresting, but also in redressing, the threatening blight of our invaluable forests.

Profile of Rural Forest Managers/Conservators

Before proceeding to discuss communication approaches and strategies, it is desirable, first and foremost, to profile the setting/milieu of media use in order to ensure a contextualised use of communication. A profile of the typical rural farmers/forest conservators will reveal that they are the predominantly non-literate, often largely inaccessible farmers/tree planters, with group-anchored, value-laden and tradition-bound beliefs and attitudes toward tree planting and forest management. Usually, among these farmers, trees are taken for granted and are seen as God-given, with little regard for replenishment when felled, and sustenance thereafter. The argument, it seems, is that the farmer plants crops, not trees, except the cash ones, as 'ordinary' trees are considered as obstacles to farming and are thus usually felled and/or burnt to ensure unshaded cropping. In this context, both exogenous and endogenous media possess the capacity for disseminating forest management information among this far-flung, heterogenous, otherwise unreachable population. Strategically applied, the media are capable of legitimizing, and thus popularizing, forest management techniques among a wide spectrum of the potential users of such information.



The Mass Media and Forest Management

The potentials of communication to contribute effectively to forest management, as highlighted above, raises the question of the role of the mass media in the development process in general, and tree growing/forest management in particular. Until recently, the transfer of new ideas was conceived as a linear, hierarchical, top-down communication from the development agents or the extension workers to the ultimate beneficiaries (Melkote, 1991, Paquah, 1997, Soola, 2002). We shall return to this shortly.

THEORETICAL FRAMEWORK

Social Responsibility Media Theory

One of the chief functions of the mass media is the 'surveillance of the environment'. In the thinking of the author of this paper, the need for environmental scanning in general, and forest management in particular, is a call to social responsibility of the media. With its origin in the Hutchin Commission of freedom of the press, the social responsibility media theory is premised on the belief that the chief duty of the media is to raise conflict to the plane of discussion (Folarin, 1998, Severin and Tankard Jr. 2000). The theory was triggered by the feelings among media watchers that the so-called free marketplace of ideas had failed to guarantee press freedom, having been hijacked by the commercial orientation of the media, which tends to limit access to a few businessmen (mostly advertisers) and media professionals. The kernel of the theory and its point of departure from the libertarian theory of the press is the demand for social responsibility and accountability, which, if need be, can be forced on the press by other institutions, should it act contrary to the principles of social responsibility. Non-adherence to social responsibility media theory may black out forest conservation information from the mass media.

Agenda-Setting Theory

Closely linked to the above is agenda-setting theory, which states that the mass media determine what issues are considered important at a given time in a given society. The crux of the theory is that, while the media do not possess the power to determine what we actually think, they do have the power to determine what we think about. The elements involved in agenda-setting, according to Folarin (1998: 68), include:

- The quantity or frequency of reporting
- Prominence given to the reports...through headline display, pictures and layout of newspapers, magazines, films, graphics or timing on radio and television.
- Degree of conflict generated in the reports, and
- The cumulative media-specific effects over time

The media can, and should, set the agenda, for conservation of natural resources in general, and forest management in particular, by frequently focusing on it and giving it prominence in their coverage.

Democratic-Participant Theory

The thrust of this theory is the need for freer access to the mass media for all potential users. In the pursuit of this, the theory advocates for decentralisation and localisation of mass media structure and control in order to ensure grassroot participation in media activities. It calls for 'horizontal' in place of 'top-down' communication, equality between sender and receiver, 'service' instead of the 'command' mode (Folarin, 1998).



This theory is in consonance with tree planting/forest management, which this paper regards as a group-anchored, culture-bound practice, in that it favours media pluralism and the establishment of localised rural community media, which can be used for community-based forest conservation intervention activities.

With specific reference to media effect, in the 50s and 60s, mass media scholars (Schramm, 1964, Rogers, 1976), development experts and policy makers were intrigued by the seeming 'direct-effect' of the media, and by the notion that information constituted the critical resource input and an independent variable in the development process. Thus, mere possession of radio sets, access to newspapers, television sets and cinema seats (Dare, 1990) were taken as positive indicators in the development calculus. Little consideration was given to the cultural and socio-structural contexts of use, unequal power relations in the society and the nature of media content, among other issues. It is not often appreciated that the mass media, a product of the metropolitan West, are primarily designed conventionally as media of information, education, entertainment and leisure. As Dare (1900 – 27) has reasoned, they are 'concerned with the glamorous'. The principles of this theory thrust onto the Nigerian media the responsibility of being in the vanguard of the campaign for forest conservation/management.

This implication of the above is that the 'direct effect' media theory of the World War years has had to change to the extreme 'no effect', and finally, to the more moderate and more realistic 'limited effect'. According to Enemaku (2002: 67), the current thinking among scholars is that while the media are 'potent', they are not 'omnipotent'.

The direct effect thesis of the mass media role in the development process was premised on the widespread, though erroneous, belief in the individual audience, the atomistic receiver, bereft of socio-cultural connections and their consequent influences on the perception and attitudes of the receiver. The focus of this media culture was the individual rather than a communality. Little consideration was given to the fact that the individual is not an island but operates within a complex web of interpersonal networks of relationships and that this link, more than any personal inclination, conditions his choices and decisions.

The foregoing appraisal of the role of the mass media in the development process is not intended to underrate their contribution to development in general, and to tree planting and forest management in particular. Rather, we have highlighted these points with a view to re-examining their capabilities and limitations so that their potentials can be maximally harvested, and their limitations minimised, in the pursuit of forest management practices. The mass media are often credited for mass reach, if not necessarily mass influence. The forest extension worker or agent is basically the source of forest conservation information. These agents are few, compared with the teeming, often dispersed, population of tree planters and forest managers that need to be reached. Recourse should, therefore, continue to be made to the mass media to reach these widely dispersed farmers with the same information or demonstration, and that simultaneously. As Lawani (1990: 7) has observed, "when productively mobilized, the mass media can be a formidable ally in the development process".



However, because of the varied capabilities of the different media, it is considered pertinent at this stage to profile the media that are of immediate relevance to this paper and discuss the options and strategies for their optimal use in forest management.

The Print Media

In this category of the mass media are the big media, - newspapers and magazines – and the ‘small media’ such as billboards, posters, handbills, pamphlets, wall newspapers and brochures. A unique advantage of the print media is permanence and the possibility of information custody and storage for close reading and future use. They can also be used to explain difficult and involved processes. However, certain user requirements often limit print media reach. The first user requirement is that he be literate, at least in the local language. Among a predominantly non-literate rural population, print media reach is severely limited.

Another requirement is the need to sustain, on a daily or weekly basis, the purchase of daily or weekly newspapers and magazines. This can be economically demanding for rural dwellers with limited, often seasonal incomes. In addition, most rural areas are inaccessible for newspaper vendoring. However, creatively and strategically used as editorials, features, news reports, columns, cartoon strips, laden with forest conservation information, the newspaper, when available, can be a potent medium for disseminating aforestation information. A newspaper can, in form of story-telling, create a forest management story column such as currently being run in New Age newspaper under the column ‘Childrens’ World’. Also, mimeographed versions of such stories can be posted on community centre walls, or even on the back of trees in strategic places in villages and rural communities. In addition, billboards, posters, pamphlets, flyers and brochures, using rich pictorial illustrations, can help, to some extent, in overcoming the barriers of non-illiteracy. In Nigeria, these are some of the strategies being used in the print media for environmental campaigns in general, and for forest management, in particular.

Radio

Radio is reputed worldwide for being the cheapest, simplest, most portable, most adapted medium of mass communication for reaching the rural population. Not only is owning a radio set relatively inexpensive, but establishing a radio station is also less expensive than running any of the other big media outfits. Today, Nigeria has a wholly (undiluted) indigenous language radio (Oyero, 2002). Also, the Federal Government of Nigeria has just approval and appropriated funds for wholly indigenous radio stations to be sited all over the country. Such a radio, speaking the local languages and their dialect variants, can design appropriate tree planting/forest management information and educational programmes for small groups of listeners. The station, in collaboration with the forest extension worker, can also organise listening/discussion forums in order to encourage a ‘talk back’ and thus minimize the unidirectional flow of information, which is usually the bane of radio use for development purposes. The strategies for its use will include commentaries, news reports, jingles, spot announcements, and interviews/discussions on forest conservation techniques. In Nigeria, these are some of the approaches to radio use generally for environmental awareness, though not much is being done specifically for forest conservation. These days, radio can even benefit from forest conservation information on the Internet. Such information, sourced from the internet, can be adapted and made situation-relevant for local use in forest management/conservation activities and projects.



Television

As a medium of information, education and entertainment, television possesses the unique characteristics of sound, sight and motion, which it combines with simultaneity. It also transcends the bounds often imposed by illiteracy on information and knowledge acquisition. In addition, its status conferral on individuals or demonstrated practices is unrivaled. Turner (n.d. 31) has aptly described television as the most suitable vehicle for the teaching of skills. Television's maneuverability by way of camera angles – the wide angle, close-up, and so on; camera movement such as the pan, the tilt, the dolly; the transitions – the cut, the dissolves, the superimposition, and so on, are excellent means of focusing on demonstrated techniques such as those of forest management conservation practices. Thus, demonstrations of modern tree planting/forest management techniques on television can make them both graphic and attractively real to rural tree growers/forest managers.

However, television suffers from severe limitations, particularly in the context of use in this paper – among rural populations. This is because television is unarguably an expensive medium. Unless generously subsidised, television sets are usually priced beyond the financial reach of the rural poor, particularly in a country such as Nigeria where the average citizen lives on 60 cents per day. Television in Nigeria remains an urban elite medium. Its centralized operations also make local involvement and participation almost impracticable. Even when television is affordable and accessible, exposure may be limited by electricity, which remains epileptic, and in severe short supply in Nigeria. Thus, forest conservation information on television in Nigeria can reach only a negligible few rural tree growers. However, the problem of reach can be minimised if Nigerian government will revive the Community Viewing Centre (CVC) project, supply communities with television and power-generating sets in places with no electricity, and as back-up for the usual, predictable power outages.

As a conclusion to this section of the paper, it is pertinent to stress that one outstanding strength of the mass media in forest conservation is their capacity to design and package programmes in the 'edutainment' mode, so that while viewers are being entertained, they are also being informed and educated.

Indigenous Media and Interpersonal Networks

Endogenous, indigenous, traditional communication or 'oramedia', whatever the nomenclature, is an age-long form of communication which predates the contemporary or modern media of mass communication. Usually referred to as the 'mass media' before the mass media (Ugboajah, 1982, 1985), indigenous communication is firmly rooted in the African indigenous Knowledge System AIKS (Emeagwali, 2005, Barnhardt and Kawagby, 2005) and cultures of traditional societies and thus gives expression to their values, norms and mores.

Being firmly anchored in the cultures of its users, indigenous communication is not only pervasive, cheap and widely accessible, it also enjoys a high credibility status. Indigenous communication is people's communication, one they can easily identify and relate with. And so, though lacking the reach and simultaneity of the conventional media, this seeming inadequacy is richly compensated for by its being influential in value-laden, group-anchored and culture-bound issues such as tree/forest management practices.



As Soala (1988) has observed, communication of new ideas by the mass media often strives to provide general information and create general awareness, ignoring such vital specifics as what the nature of the new idea is, where and how it can be obtained, at what cost, how it can be applied, and the gains of adoption. This, coupled with the impersonal and anomic nature of the mass media, often reduces their efficacy, forcing would-be adopters to seek for alternatives in indigenous media and interpersonal networks for deliberation and decision-making to adopt or resist a new idea. Thus, for most new ideas, particularly those rooted in group values, such as tree growing/forest management, our searchlight must turn in the direction of the indigenous and interpersonal networks of the rural tree grower. Katz (1968) has noted that mass media influences are often intercepted by interpersonal networks and consequently rendered more or less effective thereby.

Other indigenous media forms include traditional institutions, town-criers, folklore/stories/anecdotes, music, songs, lyrics, dances, dance-drama, festivals and rituals, professional/trade guild associations, ethnic/militia/ cultural groups and faith-based organisations/associations, all of which can be used to promote the culture of tree planting/forest management. The interpersonal networks that can also be influential in this regard include family, relatives, neighbours, friends, teachers, pastors, imams, extension workers and opinion leaders. However, it is important to recognise that both positive and negative influences often flow through interpersonal channels; an unenterprising or unsuccessful adopter may negatively influence other potentially successful ones.

The above discussion of the potentials and limitations of the media – mass, indigenous and interpersonal – is aimed at underscoring the critical point that no single medium can be relied upon for tree planting/forest management information dissemination; a multi-media strategy which exploits the rich resources of the various media forms will unarguably outperform any single medium, regardless of its avowed possibilities. However, the media forms must work in synergy, with the mass media serving to extend the reach of the indigenous media.

Education

This last section of the paper focuses on educational options and strategies for environmental awareness and possible positive attitude change, with particular regard to forest conservation. Education is here broadly conceptualised to mean both formal and non-formal education. It is intended to involve imparting and acquisition of basic knowledge and skills considered necessary for successful forest management practices. In this regard, Okigbo (1991) has observed the need for education and training in sustaining the environment, advocating a change in the educational system to reflect more knowledge of the environment and the impact of man's activities on it.



Fortunately, a positive anchor for informal educational approach to forest conservation is to be found in certain existing cultural beliefs and social practices which, according to Sanusi and Sheriff (2002), include sacred/grove forest conservation and hunting taboos in some Nigerian communities. Through such beliefs and practices, traditional knowledge and indigenous environmental wisdom, which is part of the corpus of African Indigenous Knowledge System (AIKS) in such communities have been passed on from generation to generation. In Sanusi and Sheriff's (2002: 95) words, such non-formal environmental education: was used to awaken communities to the dangers facing their environment, to arouse a sense of responsibility and promote attitudes, techniques and practices in favour of wise use, protection, restoration and improvement of the environment as a resource and a system.

In Nigeria, both the federal and state governments, as well as their agencies have been visible in the non-formal educational approach to natural resource conservation, especially through tree planting and management.

In addition, government's commitment to forest conservation is demonstrated by the involvement of the presidency in tree planting, an annual ritual which is replicated by governors at the state levels. These annual tree planting exercise help to draw attention nationally to the critical need for tree planting/forest conservation at all levels of society.

The formal environmental education approach to forest conservation dates back to 1986 with the adoption of the National Policy on Education, followed three years later in 1989 by the National Conservation Education Strategy (NCES) of 1989 (Sanusi and Sheriff 2002). In pursuance of this formal environmental educational approach, the Federal Ministry of Education had issued a directive to all schools and colleges to establish environmental clubs, thus giving rise to the emergence of the Young Farmers, Young Foresters and Tree Clubs in many schools and colleges across the country. Yet another active agency in both formal and non-formal environmental education is the Nigerian Environmental Study/Action Team (NEST), which makes information on the environment available at all levels of education and to all the three tiers of government, as well as to environment-friendly individuals, groups and communities.

Conclusion

This paper has underscored the critical significance of forest conservation/management in stabilizing the fragile ecosystems and ensuring socio-economic and environmental health of society. It profiled the typical rural farmer/tree manager and described his demographic and psychographic characteristics. It identified and discussed the potentials and limitations of both the indigenous and exogenous media, and offered options and strategies for their effective use in disseminating forest conservation/management information with a view to sensitizing and conscientising the Nigerian populace to the need for responsible and responsive forest management. It concludes by highlighting the possibilities of formal and non-formal environmental educational approaches and strategies for stemming the current devastating drift into forestlessness in the nearest future.



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ENVIRONMENTAL SECURITY: ECOLOGY OR INTERNATIONAL RELATIONS?

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The juxtaposition of security and environment raises more profound issues for international relations than many scholars and policy commentators have addressed in any detail. Analyses within IR have investigated the relationships between environmental change and violence and come to the conclusion that international conflict is unlikely as a result of environmental change. They have also used environmental agreements and negotiating processes as an analytical focus for research into the dynamics of international regimes. But in most of these analyses environment is a backdrop, independent variable to conventional social science concerns. The small critical literature suggests that environmental degradation is very substantially driven by the processes implicit in the normal operations of international politics; hence the analysis takes for granted precisely what it ought to investigate. This difficulty is especially clear in the discussion of environmental security, where it surfaces frequently in discussions of the necessity of rethinking security, whether in terms of common, comprehensive or human security. But much of this literature simply extends the dilemmas rather than shifting the analytical gaze to investigate the simultaneous causes of both insecurity and environmental change. Once this connection is directly addressed ecology then opens up the possibility of more drastically rethinking the scope and purposes of international relations and the centrality of the assumption that security is the overarching rationale for the endeavor in the first place.

Environmental Security

Since the late 1980s the discussion of environmental security has continued apace with conceptual arguments intersecting regularly with both empirical research and policy advice. While there is agreement in most of the literature that environmental changes are unlikely to directly cause inter-state warfare, there remains considerable discussion about the likely trajectories of environmental change causing state "failures" and the likely disruptions that might result. Likewise there is considerable discussion of the appropriate policies to anticipate such failures and the possibilities of aid packages as preventative interventions. Not surprisingly the main focus in many of these discussions is on states, their performance, interactions and capabilities. In so far as the conclusion that states are unlikely to go to war as a result of environmental scarcities or changes holds, the question then becomes in what way is this a matter for detailed attention by international relations scholars and especially those interested in security studies.



Environmental security might more obviously be a matter for those interested in global political economy where power is understood as enmeshed in international production systems, although with a few notable and important exceptions, such connections have not been followed up in much detail.^{96[1]} Perhaps most obviously, given that environment might lead to state collapse and internal violence within states, it would appear to be a matter better handled by those with a disciplinary training dealing with matters of rural sociology or specifically matters of resource use and development. The field of political ecology is especially germane given the recent critical attention given to Thomas Homer-Dixon's approach to environmentally driven conflicts in particular.^{97[2]} Perhaps a few ecologists just might have something to say on these matters too?

In a couple of recent essays Hugh Dyer has put this matter directly in suggesting that the literature in international relations dealing with these issues needs to confront the question of which contains what.^{98[3]} Global environmental change is much more than international change and the suggestion is that it drives international responses, whether in terms of security, economy or other matters. "In some respects environmental change is the greatest challenge for international relations theory since this appears as a material externality to the international system rather than as an internal variable which can be addressed in terms of familiar political structures and their supporting social values. Thus environmental change may present security concerns which are qualitatively different from traditional security threats, and in itself present a material basis for a broad shift in social values."^{99[4]}

This directly raises the question of whether the environment to be understood as a matter of international politics, a matter of potential security concern and a matter for regulation in various international regimes or is international politics to be understood as a matter that happens within the environment, a matter of politics within natural circumstances which get priority in how matters are conceived and policy devised? This slightly reformulates the earlier questions in the environmental security discussion as to whether what is implicitly getting secured is the international order or the natural environment.^{100[5]}

^[1] Matthew Paterson Understanding Global Environmental Politics London: Macmillan 2000; Dimitris Stevis and Valerie Assetto (eds) The International Political Economy of the Environment Boulder: Lynne Rienner, 2001.

^[2] Thomas Homer-Dixon, Environment, Scarcity, and Violence Princeton, N.J.: Princeton University Press, 1999.

^[3] See Hugh Dyer "Environmental Security and International Relations: The Case for Enclosure" Review of International Studies 27(3). 2001, pp. 441-450.

^[4] Hugh Dyer "Theoretical Aspects of Environmental Security" in Eileen Petzold-Bradley, Alexander Carius and Arpad Vincze (eds) Responding to Environmental Conflicts: Implications for Theory and Practice Dordrecht: Kluwer Academic Publishers 2001, p. 68.

^[5] See Jyrki Kakonen (ed.) Green Security or Militarized Environment Aldershot: Dartmouth, 1994.



What cannot be assumed is that there is a necessary congruity between these two. Indeed the whole premise of the parallel discussions of sustainable development in the last couple of decades is precisely that the conventional modes of economic activity practiced in most parts of the world were not sustainable.^{101[6]}

The major question raised here is what kind of shift in social values might come from taking environment seriously as a material necessity driving international politics. How might this qualitatively different understanding of security be imagined and what kind of contribution might international relations make to such an undertaking. Such speculative undertakings are fraught with intellectual dangers; indeed they might not be considered social science at all by many scholars trained in conventional research modes. But what the critics have been saying for some time now is that taking environment seriously requires thinking in unconventional ways. If Hugh Dyer is correct about the importance of global environmental change, and the following sections will suggest that he is, then conventional political structures and their supporting social values are not necessarily appropriate for thinking about environment. This being the case there is no good reason to assume that conventional international relations thinking will provide the necessary intellectual toolkit for addressing these new formulations of security. Neither, and this is the most important point, is there any good reason to think that ecological matters can be usefully understood in terms of security from some external threat at all.

Environment and Global Change

Environment is a catchall residual category which usually refers to the non-human material context of human activities. Premised on the extraordinary modern assumption that divisions between humanity and the rest of the biosphere are a useful ontological starting point the term environment has come to encompass the definition of the part of "nature" that provides the backdrop for human affairs. When it shows up in discussions of security it is frequently the changes in specific environments in terms of resource scarcity that are the focus of analytical attention. Other considerations of the disruptions caused by climate change and related matters also appear in the environmental security literature, although these are often speculative exercises in constructing plausible future scenarios, or extrapolating from contemporary events, rather than analyses based on the historical case studies that have become available recently in the environmental history literature.^{102[7]}

[6] The classic statement is the so called Brundtland Commission report: World Commission on Environment and Development Our Common Future Oxford: Oxford University Press 1987 but the theme and the complex debates about terms and definitions continues in the lead up to the World Summit on Sustainable Development in Johannesburg in September 2002. See Felix Dodds (ed.) Earth Summit 2002: A New Deal London and Sterling, VA: Earthscan, 2000.

[7] Alfred Crosby, Ecological Imperialism: The Biological Expansion of Europe 900–1900 Cambridge: Cambridge University Press, 1986; H. H. Lamb, Climate, History, and the Modern World, 2d ed. London: Routledge, 1995.



But the assumption of a stable backdrop that is being changed in some places is not now an adequate representation of what the scientific literature on global ecology has been describing in increasing detail for the last few years or what environmental history has been investigating.^{103[8]} In Hugh Dyer's terms the material context driving international politics is changing and that point has to be integrated into the conceptual frameworks that link environment to security, and especially so in terms of the discipline of international relations, where at least some of the change in political arrangements needed to address this changing context will have to be studied and analyzed. Whether what will result will be international relations as currently practiced is highly doubtful, but prior to discussing such matters the question of the changing material context needs more detailed study.

What is now frequently simply called global change science has, in the last few decades, begun the task of synthesizing knowledge from many disciplines while extending the monitoring of numerous aspects of the planetary biosphere. It has also incorporated historical research into the planet's past and looked in detail at the crucial matters of atmospheric composition and climate change.^{104[9]} A number of noteworthy conclusions have already been reached which affect our understanding of ecology in ways that matter in terms of what security might now mean. While the sheer scale of change is important, the most worrisome matter is the unpredictability of forthcoming changes. Three aspects of the contemporary literature on global change are especially salient.

First is the importance of understanding the scale of anthropogenic disruptions of the atmosphere, and in particular the fact that humanity has altered the composition of the gases in the air to such a degree that there is no parallel in the last 400,000 years for which science now has a fairly comprehensive geologic record. That period has been recorded in the so called Vostok ice cores extracted from Antarctica and analyzed in detail in the last few decades.^{105[10]} The conclusions from this analysis are quite clear in that climate is related to carbon dioxide concentrations through the last four glacial periods. Climate and carbon dioxide oscillated within a fairly stable range during that period, but we are now already outside that range of relative stability. In the words of the International Geosphere Biosphere Program (IGBP) authors we are living in a "no-analogue state", a situation where we are already beyond the bounds of the system that produced ice ages and "inter-glacials" in between.^{106[11]} This alone ought to be reason for great concern, and it has been through the 1990s where scientists have repeatedly called for dramatic reductions in emissions of carbon dioxide from human activities in the hope that CO₂ levels can be reduced to within the historic ranges that provided relative stability to the earth's climate in the past and provided the conditions for the emergence of human civilization.

^[8] J. R. McNeill, Something New Under the Sun: An Environmental History of the Twentieth-Century World New York: Norton, 2000.

^[9] For the most recent overview by the Intergovernmental Panel on Climate Changes see James McCarthy et.al. (eds) Climate Change 2001: Impacts, Adaptation, and Vulnerability Cambridge: Cambridge University Press, 2001.

^[10] J.R.Petit et.al. "Climate and atmospheric history of the last 420,000 years from the Vostok ice core, Antarctica" Nature 399. June 1999, pp. 429-436.

^[11] "Global Change and the Earth System: A Planet Under Pressure" IGBP Science No. 4 2001.



Second, is the recognition that it is not only the atmosphere that we have changed but other important natural systems too not least nitrogen and phosphorous cycles in the biosphere. The cumulative impact of these parallel disruptions of other material and energy cycles and maritime systems and terrestrial land uses suggests to the IGBP that the geological period known as the Holocene, the last 10,000 years since the most recent ice age, is now effectively over. They have coined the apt term the "Anthropocene" to denote the arrival of a new geological period where a dramatic new series of forces have been unloosed in the planetary biosphere changing the atmosphere as well as geomorphic processes and most natural cycles that involve a biomass of any substantial size. Literally we have entered a new geologic period in which humanity has become an agent in remaking some of the essential systems of the global biosphere.

Third, is the fact that these changes interact and cascade through the earth's natural systems in ways that are hard to predict precisely because so many things are changing at once and interacting in ways that are impossible to comprehensively grasp and model. But they do so in ways that are not likely to give either immediate or linear responses. Lagged effects due to inertia, and non-linear responses due to the crossing of crucial thresholds of relative stability, are likely results in complex interconnected systems. Given that science does not know where the critical thresholds of many of these systems may be, or whether we have in fact already crossed some of them, thinking hard about ways of reducing the overall impact of human disruptions has become a pressing necessity if the long term survival of human civilization is taken seriously.

In combination these three factors suggest that the assumption of the environment as the backdrop or context for human history is no longer an appropriate way of thinking. There is no longer a stable "environment" that can be "secured". Neither is there a predictable environment that might be said to threaten humanity in precise ways. Humanity is actively, albeit inadvertently, changing the overall conditions of its existence. No longer can nature be seen as something external to human designs. In the language of astronomy and space exploration we are already "terraforming" the earth, changing the overall patterns of basic life systems in the process of remaking our specific contexts, not least to supposedly secure our modes of life. This terraforming changes the basic assumption of human-nature relations. As aboriginal "environmental" activists in many places have long been trying to point out, the interconnectedness between people and other living things is unavoidable; global systems science is now saying the same thing, albeit in a slightly different vocabulary.^{107[12]}

^[12] A point reiterated recently in Al Gedicks Resource Rebels: Native Challenges to Mining and Oil Corporations Boston: South End, 2001.



International Relations

The response to the emerging understanding of the scale, gravity and urgency of the global change crisis has been varied. In diplomatic circles numerous agreements have been negotiated on many environmental themes, although attempts to deal with climate change under the terms of the framework convention negotiated as part of the Earth Summit a decade ago have been, so far at least, singularly ineffective when measured either by diplomatic accomplishment or the need to drastically reduce, as opposed to just limit, emissions. While the problem may in many ways be "global", the appropriateness of these modes of tackling climate change must be called into question by a decade of less than impressive international efforts. The alternative perspective from international political economy implies that progress is more likely to be made by actively promoting the construction of economies that don't rely heavily on fossil fuels rather than trying to regulate their usage in ever more complex manners.^{108[13]}

International relations operates on the basic assumption that states, given sovereign recognition in common, are at least legally equivalent units in the international system. Granted some are more powerful than others, but their rights in terms of international legal personality and their privileges granted in terms of sovereignty are assumed to make them the key actors in international politics. But shifting the focus to global changes suggests that this assumption is not necessarily a useful starting point for thinking about what is still inadequately understood in terms of environment. Clearly the trans-boundary "flows" of environmental politics have challenged the assumptions of sovereignty in many ways that require international cooperation on many themes. In this sense the "greening" of sovereignty is occurring and the importance of international cooperation made evident, but environmental themes also do point to the limits of thinking in terms of sovereignty in the first place.^{109[14]}

Global change suggests a more fundamental reorientation of thinking which decenters the assumptions of states as the crucial actors for dealing with contemporary difficulties. They may well be essential for administering agreements and enforcing laws, but innovation frequently comes from outside the structures of state bureaucracies and in spite of government planning. Ecological processes are not constrained by state frontiers. Environmental disruptions are frequently caused by economic activities that supply resources to distant markets, insurgency in Bougainville is caused by demands for metals far from the remote provinces of Papua New Guinea; vegetable purchasing preferences on the part of supermarket company produce buyers at Heathrow airport near London drive the practices of Kenyan farmers.^{110[15]} Environmental security is not just about state policies and initiatives.^{111[16]}

[13] Matthew Paterson "Climate Policy as Accumulation Strategy: The Failure of COP6 and Emerging Trends in Climate Politics" Global Environmental Politics 1(2). 2001, pp. 10-17.

[14] Karen Litfin, ed., The Greening of Sovereignty in World Politics Cambridge: MIT Press, 1998.

[15] Volker Boge, "Mining, Environmental Degradation, and War: The Bougainville Case," in M. Suliman, ed., Ecology, Politics, and Violent Conflict London: Zed, 1999, 211-27; Hazel R. Barrett, Brian W. Illbery, Angela W. Browne, and Tony Binns, "Globalization and the Changing Networks of Food Supply: The Importation of Fresh Horticultural Produce from Kenya into the UK," Transactions of the Institute of British Geographers, n.s., 24. 1999, 159-74.



The enormous differences between states in terms of capabilities and development levels also belies simple assumptions about them as the most effective agent of change in many places. The fundamental inequities between North and South stand in the way of progress on many things, although the recognition of this difficulty is finding its way into both international negotiations and efforts to think intelligently about such things as "sustainability science".^{112[17]}

But the most important point in thinking about states and international relations in the face of global change is the simple but compelling argument that states are precisely the agencies that, in the twentieth century, built the infrastructure that requires huge inputs of carbon fuels and other materials that disrupt biospheric systems. Only the most obvious facet of this is the active promotion by states of what is now called car culture.^{113[18]} Building highways and roads was part and parcel of state functions in most parts of the world in the twentieth century, a trend that shows few signs of abating outside Europe. Just as states were active in facilitating the construction of railways in the nineteenth century they built road networks, ports and airports in the twentieth producing an economic mode that is literally driving climate change. A case, if there ever was, of foxes guarding chickens. Now that the atmospheric chickens are coming home to roost the appropriateness of the state fox is now very obviously in doubt.

The crucial question is in part whether states can reinvent themselves to construct new infrastructures that do not depend on ever larger throughputs of resources, or whether states are an intrinsic part of the problem. Municipalities and corporations, sensitive to the need to improve the practical living conditions of their residents and aware of the consequences of their raw material extractions and production systems may be better placed to take the necessary initiatives to reduce environmental impacts while simultaneously promoting poverty alleviation in the South by selectively importing commodities that are sustainably produced there.^{114[19]} Thinking in these terms, and specifically of the flows of materials and energy through economic systems regardless of the location of international boundaries, is an ecological approach in stark contrast to the cartography of state security. Given the nearly complete monopoly of state centered thinking in contemporary political discussions, and especially in security matters, with the concomitant assumptions that politics is about state agreements and their administration and enforcement, such thinking points in very different directions.

^[16] Despite some assertions to the contrary, see Braden R. Allenby, "Environmental Security: Concept and Implementation," International Political Science Review 21(1). 2000, pp. 5–21.

^{112[17]} Robert W. Kates *et.al.* "Sustainability Science" Science 292. April 2001, pp. 641-642.

^[18] Matthew Paterson, "Car Culture and Global Environmental Politics" Review of International Studies 26(2). 2000, pp. 253-270.

^[19] See for instance the innovative suggestions in W. Sachs, R. Loske, and Manfred Linz, Greening the North: A Post-Industrial Blueprint for Ecology and Equity London: Zed, 1998.



The conventional political assumptions in state thinking, that environment is an external entity to be controlled, patrolled, surveyed, monitored, catalogued and administered is not new. Rather such environmental practices, what Tim Luke might call "environmentality" is a longstanding mode of rule that can be directly traced to colonial arrangements in many places over the last few centuries.^{115[20]} Tracing matters to the long term history of imperial ecological arrangements suggests once again the inadequacy of contemporary institutional arrangements for grappling with the scale and scope of contemporary transformations. The modern state system is of recent origin; in many parts of the world it post-dates the emergence of the technological systems literally driving climate change. Assuming that this administrative framework is necessarily adequate because of the contemporary attribution of sovereignty to states is an obvious response to environmental difficulties, but not one that reassures those who look to the long term political ecology of the planet.^{116[21]} The processes in motion predate states in many places and in many ways call into question the basic functions of contemporary states that are so frequently better understood as development agencies. The infrastructure they provide is in many ways the source of contemporary ecological disruptions, hence the assumptions that these agencies are necessarily the solution is not one that can be taken for granted.^{117[22]}

Global Security

The arguments about environmental security are extensive and beyond the scope of this paper to recapitulate, but the key point that recent critics have emphasized concerns the question of what exactly is being secured.^{118[23]} Traditional security analyses which lead to discussions that environmental matters might cause warfare have not produced many plausible scenarios of immediate concern.^{119[24]} The argument that environmental degradation might lead fairly directly to interstate conflict has by now been rejected by most researchers in the field. Water wars are not very likely although there are a few important exceptions where conflict might yet ensue. What is becoming clear is that in many places in the periphery of the global economy struggles over resources are prevalent.

[20] Tim W. Luke, Capitalism, Democracy, and Ecology: Departing from Marx Champaign: University of Illinois Press, 1999. On colonialism see Richard Grove, Ecology, Climate, and Empire: Colonialism and Global Environmental History, 1400–1940 Cambridge, England: White Horse, 1997.

[21] Part of the argument in Simon Dalby Environmental Security Minneapolis: University of Minnesota Press, forthcoming fall 2002.

[22] Ken Conca "Environmental Cooperation and International Peace" in Paul F. Diehl and Nils Petter Gleditsch (eds) Environmental Conflict Boulder: Westview, 2001 pp. 225-247.

[23] Peter Stoett, Human and Global Security: An Exploration of Terms Toronto: University of Toronto Press, 1999; Jon Barnett, The Meaning of Environmental Security: Ecological Politics and Policy in the New Security Era London: Zed, 2001.

[24] Paul F. Diehl and Nils Petter Gleditsch (eds) Environmental Conflict Boulder: Westview, 2001.



But these are often traditional land wars on the fringes of agricultural settlement or struggles to control the revenue streams earned by the export of resources, whether strictly "environmental" or not. Minerals, timber, diamonds and oil are struggled and fought over in many parts of the world although their connection with environmental change and degradation is frequently not in a manner that makes conflict simply a result of "environmental" change.^{120[25]}

The assumptions that warfare is likely as a result of environmental change do not exhaust the range of concern. The initial focus of policy concern in the late 1980s where the argument was less that environmental change will cause warfare than that environmental disruptions threaten people in many ways that might be said to render them insecure. Phrasing matters of environmental concern in terms of security as a strategy to gain political attention has turned out to be a dubious rhetorical device.^{121[26]} But the matter of various forms of endangerment as a result of environmental themes and the priorities that might be afforded these continue to raise the possibility of understanding such matters in terms of securing the environment. Several matters of global scope fit within such thinking. Barnett and Dovers itemize three; biodiversity, climate change and nuclear hazards as being of a sufficient spatial and temporal scale, and so difficult to reverse, as to qualify as matters of global security.^{122[27]}

Given the analyses now appearing from the international science community and especially discussions of the scale of human impacts in terms of "no-analogue states" and the beginning of the "Anthropocene" it is clear that the relatively stable biospheric conditions of the last ten millennia cannot be taken for granted in even the near term future. The rapid collapse of biodiversity is reversing the geological trend to increased variety of species, a matter of long term concern well beyond the alarm on the part of pharmaceutical advocates concerned that medicinal plants are being extirpated. The potential for further Chernobyl style disasters cannot be ruled out, despite technological innovation in the nuclear industry and the global reach of nuclear fallout is now common knowledge. As the IGBP analyses discussed above make clear the most important point about global change is not any one of these themes, be it climate, biodiversity, radiological pollution or even ozone depletion, nitrogen or phosphorus cycle disruptions, but rather the fact that all these matters are occurring simultaneously and cascading through the biosphere in unpredictable interactive manners.

^[25] David Keen, The Economic Functions of Violence in Civil Wars, London: International Institute for Strategic Studies, Adelphi Paper 320, 1998; Mats Berdal and David M. Malone eds. Greed and Grievance: Economic Agendas in Civil Wars Boulder: Lynne Rienner, 2000; Philippe le Billon "The Political Ecology of War: Natural Resources and Armed Conflicts" Political Geography 20(5). 2001, pp. 561-584.

^[26] Daniel Deudney, "Environmental Security: A Critique," in Daniel Deudney and Richard Matthew, eds., Contested Grounds: Security and Conflict in the New Environmental Politics (Albany: State University of New York Press, 1999), 187-219.

^[27] Jon Barnett and Stephen Dovers "Environmental Security, Sustainability and Policy" Pacifica Review 13(2). 2001, 157-169



Phrased in these terms it is not difficult to render such matters extraordinary and beyond the normal operation of politics and human activity. But whether such threats to human welfare can be usefully designated as security is doubtful and it is also clear that the poor and the marginal populations in the South are likely to be much less likely to adapt to changes than the rich in the Northern metropolises who can use their wealth to avoid the consequences of local environmental changes. As Dovers and Barnett suggest climate change, biodiversity loss and some nuclear technologies clearly fit the criteria of what ought to be rendered as a global security threat, but the failure of many to respond to such threats suggest that their designation in these terms is not any more effective than the use of other vocabularies. Skeptical realists will at this point no doubt reassert the inevitability of faction, the unavoidability of short term parochial interest and the impossibility of global efforts. But the dangers remain as concerned ecologists never tire of reminding the few people who bother to listen.

Part of the difficulty follows from the fact that the specification of security still relies on tropes of interiority and exteriority, an intact entity in need of protection from external, in this case environmental sources of danger. But the point about global security is precisely that the source of the dangers is internal, not a matter of keeping the bad guys out, but rather a matter of rethinking what it is that we who are insecure do to stop rendering ourselves so. The technological specifications of security, the assumptions of the technical fix rather than a more fundamental reorganization of our consumption lifestyles and the global economy that fuels and feeds them are part of the problem; so too is the assumption of the environment as external to humanity. At its most basic the problematic of global environmental security challenges the taken for granted identities of modernity, the consumer citizens of the Northern metropolises, as that which are in need of securing. The political vocabularies on offer presenting an alternative are not promising, but such rethinking seems a pressing necessity once one starts investigating the literature of ecology.

Political Ecology

The assumptions that the endangered humans are within the environment that supposedly endangers them is one of the basic premises in the contemporary literature on political ecology. Challenging the Malthusian premises of much of the 1990s discussion of environmental security, Robert Kaplan and Thomas Homer-Dixon in particular, this literature suggests that most of the environments in which violence occurs are ones that are better understood in terms of complex political struggles within cultural patterns of ownership, control and responsibility for environments.^{123[28]}

[28] See Piers Blaikie and Harold Brookfield, Land Degradation and Society (London: Methuen, 1987); Richard Peet and Michael Watts, eds., Liberation Ecologies: Environment, Development, Social Movements (New York: Routledge, 1996); Raymond Bryant and Sinead Bailey, Third World Political Ecology (London: Routledge, 1997); Roger Keil, David V. J. Bell, Peter Penz, and Leesa Fawcett, eds., Political Ecology: Global and Local (London and New York: Routledge, 1998); Philip Stott and Sian Sullivan, eds., Political Ecology: Science, Myth, and Power (London: Arnold, 2000), and specifically in response to Thomas Homer-Dixon and neo-Malthusian interpretations of environment and violence, Nancy Peluso and Michael Watts (eds) Violent Environments Ithaca: Cornell University Press, 2001.



Viewed in these terms, rather than in economic terms that presuppose scarcity as a general human condition, much of the contemporary violence is over access to wealth and the distribution of the benefits and costs of "development" rather than squabbles over increasingly scarce resources. The intrusion of commercial arrangements into landscapes long operated in terms of moral economies and traditional informal tenure systems is frequently the cause of much of the violence. External disruptions and internal politics play in complex ways in the mobilization of identities by local political leaders.^{124[29]}

Among the most important themes in the political ecology literature is the recognition of the complexity of the modes of economy in rural areas. Important too is the point that population density is not simply related to environmental destruction; in many places increases in rural population coincide with more intensive cultivation and a diversification of planting and harvesting strategies. Increased biodiversity in a region is not incompatible with a rising rural population if the local political economy of land ownership allows people to respond in these ways to the need for increased food production. Population pressure need not necessarily lead to environmental destruction; it can frequently lead to innovations in land use and animal husbandry that increases resilience of both economy and ecology.^{125[30]} Neither does deforestation necessarily result from population increases, despite the alarmist assumptions that it does in the much cited writings of journalist Robert Kaplan.^{126[31]}

But to think in these terms requires seeing people as part of ecology rather than as an external imposition on a supposedly pristine nature. This latter specification is an urban managerial assumption which dates most obviously from the European colonial experience and the construction of "empty" parks as game reserves and "conservation" areas. But it is not a mode of thinking that is especially sensitive to either ecological context or human history. Given the diversity of human cultures and the variety of ecological circumstances that humanity has existed within a mode of analysis that privileges universal patterns over specific contexts is always in danger of inappropriate generalizations. Nonetheless the generalizations that do seem to hold are those that relate to the incorporation of peoples into the modern economy as it has spread in the last couple of centuries.

^[29] These are sometimes discussed in terms of core-periphery conflicts: see Gunther Baechler, "Why Environmental Transformation Causes Violence: A Synthesis," Environmental Change and Security Project Report 4 (1998): 24–44;

^[30] Melissa Leach and Robin Mearns, eds., The Lie of the Land: Challenging Received Wisdom on the African Environment Oxford: James Currey, 1996.

^[31] Robert Kaplan, The Coming Anarchy: Shattering the Dreams of the Post Cold War New York: Random House, 2000; Melissa Leach and James Fairhead "Challenging Neo-Malthusian Deforestation Analyses in West Africa's Dynamic Forest Landscapes" Population and Development Review 26(1). 2000, 17–43.



Environmental History

The arguments about humans embedded in landscapes and the struggles over "environment" as a long term pattern rather than something new needs to be complemented by a consideration of the history of "environmental" disruptions and their intersection with changing economic circumstances.^{127[32]} In particular the consequences of the incorporation of many parts of the world into the global grain market in the latter decades of the nineteenth century, when coupled with the droughts and climate disruptions of a series of El Nino Southern Oscillation (ENSO) events, suggests that the complexities of the relationships between environment and politics cannot be understood without a clear understanding of the impact of the world market on local disasters. Famine and finance became intimately interconnected as carboniferous capitalism provided the technologies of steam ships and railways that linked the world together in novel and destabilizing ways. "Suddenly the price of wheat in Liverpool and the rainfall in Madras were variables in the same vast equation of human survival."^{128[33]}

The already weakened societies in many places, with their survival mechanisms disrupted by the impact of new price mechanisms which responded to shortage by raising prices and so making food unavailable to millions, were unable to resist another spate of European imperialism which extended the colonial reach to most of the rest of Africa and Asia. It is here in the interconnections between famine, finance and imperial adventures of the nineteenth century that so many of the seeds of the emergence of the "third world" and subsequently the "South" were sown. In Karl Polanyi's phrase "the Great Transformation" from subsistence to market economies brought with it huge social disruptions as whole modes of life were rapidly, and frequently disastrously, disrupted.^{129[34]} The impoverished South and the rich North are the product of dramatic changes in the organization of the world economy in the nineteenth century. The manifestations of the disruptions of the growing global trade in the form of famine were increasingly blamed on the weather just as meteorological data was starting to suggest the importance of large scale weather fluctuations in what would much later become understood in terms of ENSO. Prior explanations in terms of the disruptions of colonial companies or the misplaced policies of imperial administrators were eclipsed by accounts of climatological causes for human misery.

[32] Richard Grove, Green Imperialism: Colonial Expansion, Tropical Island Edens, and the Origins of Environmentalism, 1600–1800 Cambridge: Cambridge University Press, 1995.

[33] Mike Davis Late Victorian Holocausts: El Nino Famines and the Making of the Third World London: Verso, 2001, p. 12.

[34] Karl Polanyi The Great Transformation: the Political and Economic Origins of Our Time Boston: Beacon 1957.



The importance of this history for understanding contemporary discussions of environmental security is very considerable, not least because it emphasizes the importance of understanding the complexity of traditional and indigenous social systems and their inherent resilience in terms of risk aversion agricultural strategies and moral economies of survival. In contrast the commercial systems that replaced them emphasized maximization of production and the efficacy of market forces to supposedly alleviate shortages. But the lack of purchasing power on the part of numerous marginalized farmers and their families belied the efficacy of market solutions to empire wide famines. But at the same time famines were effectively eradicated as a source of hazard to European populations; the tragic loss of life in Ireland in the 1840s in the so called Great Famine was not to be repeated in Western Europe, whatever about further East in the political turmoil of the first half of the twentieth century.

The parallels with the twentieth century can easily be drawn, where famine stalks poverty stricken populations in many places, but the global economies of agribusiness ensure that food supplies are not an issue for the urban populations of the Western metropolises. The attribution of shortage to natural events in the nineteenth century generated much discussion of sun spots and climatological phenomena as the causes of tragedy but also extended discussions to suggest that the "market" was also a natural phenomena thus evading questions of the specific institutional contexts in which the fluctuations of grain production and prices were turned into human tragedy. Environmental determinism has a complex history intimately linked to the moral legitimization of empire in the latter years of the nineteenth century; twenty first century scholars need to remember the complex political history of invoking natural phenomena to explain social events, especially so when arguments concerning global change structure the discussions and invoke universal claims to a common human condition.^{130[35]}

Ecology

Thinking about matters in terms of ecology suggests the importance of challenging the dominant binary structure of the debate in Anglo-American thinking between the anthropocentric and non-anthropocentric formulations of ecologism. Ecology also suggests a vocabulary of connections that is not necessarily obvious in Anglo-American environmentalist thought, not least because of its romantic roots and its frequently unreflective incorporation of colonial categories with their implicit and explicit assumptions of empty natures and pristine wilderness on the one hand, and the necessity of administration of these spaces in terms of resources on the other.^{131[36]} In the apt words of Arturo Escobar:

^[35] See Ronnie Lipschutz, "Environmental Conflict and Environmental Determinism: The Relative Importance of Social and Natural Factors," in N. P. Gleditsch, ed., Conflict and the Environment Dordrecht: Kluwer, 1997, 35–50.

^[36] Not all environmental thinking is obviously trapped in these categories. More radical formulations of green politics run loosely in parallel with the ecological science emphasised in this paper. See Eric Laferrière and Peter J. Stoett, International Relations Theory and Ecological Thought (London: Routledge, 1999)



Although ecologists and ecodevelopmentalists recognize environmental limits to production, a large number do not perceive the cultural character of the commercialization of nature and life integral to the Western economy, nor do they seriously account for the cultural limits which many societies have set on unchecked production. It is not surprisingly that their policies are restricted to promoting the “rational” management of resources. Environmentalists who accept this presupposition also accept imperatives for capital accumulation, material growth, and the disciplining of labor and nature. In doing so they extrapolate the occidental economic culture to the entire universe.^{132[37]}

The bifurcations between deep and shallow, or managerial and philosophical approaches to environmental thinking is not a structuring principle in much French Green theory.^{133[38]} As such it may provide a vocabulary that avoids some of the traps of Anglo-American thinking and the categories that frequently limit how environment can be thought. A detailed engagement with French thinking is beyond the terms of this paper but a couple of themes are worthy of brief mention. Specifically Felix Guattari understands the need to respond to ecological crisis in terms of three overlapping ecologies, or an ecosophy of three ecological registers; the environment, social relations and human subjectivity.^{134[39]} Its precisely the interconnections of the three themes that he emphasizes as the key point for a political response to the contemporary crisis. In slightly different synthetic terms Bruno Latour suggests the importance of hybrids in the current context, phenomena that deny easy classification as either natural or artificial due to their complex histories in a world being changed by humans.^{135[40]} Stretching the point of this a little, in light of the formulation of contemporary geological times in terms of the Anthropocene, it is now plausible to argue that the planetary biosphere itself is in some important ways a hybrid entity, no longer a “natural” context but increasingly an artificial habitat.^{136[41]} This is especially germane in light of the analyses from earth systems sciences and the rethought contextualizations of environmental history on the large scale and political ecology on the small scale.

[37] Arturo Escobar “Constructing Nature: Elements of a Post-Structural Political Ecology” in Richard Peet and Michael Watts eds., Liberation Ecologies: Environment, Development, Social Movements (London: Routledge, 1996), p. 53.

[38] Kerry H. Whiteside Divided Natures: French Contributions to Political Ecology Cambridge, MA: MIT press, 2001

[39] Felix Guattari The Three Ecologies London: Athlone, 2000.

[40] Bruno Latour We Have Never Been Modern Cambridge, MA: Harvard University Press 1993.

[41] Simon Dalby “Environmental Geopolitics: Nature, Culture, Urbanity” in Kay Anderson, Mona Domosh, Steve Pile and Nigel Thrift (eds) Handbook of Cultural Geography London: Sage, forthcoming.



While this has the political result of undercutting simple appeals to the necessities of preserving "nature" it does focus attention on the global consequences of particular actions. In this sense at least environment can be said to be over. The artificial ecologies of the future are, to an increasingly large extent, being decided by the production decisions of contemporary consumers and the industrial systems that shape their choices, even if the consequences of these actions are not clear to those same consumers. Especially so as the North American love affair with Sports Utility Vehicles shows little signs of abating despite their obvious implications of increasing urban air pollution and dependence on Mid East oil supplies not to mention causing atmospheric change on the largest of scales. Understanding ourselves and our relations to others as directly implicated in the construction of a biosphere is not congruent with most contemporary urban dwellers sense of who they are. But the scale of anthropogenic changes in the biosphere suggests that this is precisely what is happening; its time the categories in which "environmental security" is discussed were updated to take this context seriously.

Most specifically the analyses from the environmental history of the late nineteenth century suggest a complex geography of interconnection as the necessary starting point for analysis. Human vulnerability on the large scale is about social and economic connections much more so than it is about strictly environmental matters. As social scientists who study these things have long understood, famines are about poverty and the failure of economic systems much more than strictly about droughts.^{137[42]} While meteorological specifications of famine hazard allowed the dramatic disruptions caused by imperialism to be discounted as a cause of misery in the nineteenth century capitals of Europe, so too the neo-Malthusian specifications of environmental causes of environmental insecurity allow the attribution of contemporary disruptions to external phenomena. But the literature of global change science with its emphasis on the importance of interconnections and the complex interaction of natural systems that human activity is disrupting, now make such assumptions completely untenable as the premise for "environmental security" discussions.

Ecology, Security and Subjectivity

There are a number of important points to be drawn from such an analysis. Integrating diverse disciplinary perspectives is rarely easy. But the more important point is that the categories through which contemporary matters of "environmental security" can be understood are not nearly as obvious as they have frequently appeared to either environmentalists or security scholars. The juxtaposition of ecology and security challenges the categories of international relations in terms of what might be understood as a threat, and ecology in terms of the limited possibilities of innovative policy within current international institutions and the global political economy.

^[42] A. Sen, Poverty and Famines Oxford: Clarendon, 1981. See also Michael Watts, Silent Violence: Food Famine and Peasantry in Northern Nigeria Berkeley: University of California Press, 1983.



While international relations thinking has relevance to understanding environmental matters and while there are sometimes compelling reasons for thinking about environmental dangers in terms of security, neither term necessarily implies the appropriate scope or scale on which these matters need to be addressed. Nor is the environment something stable that can be secured even if the term now refers to natural processes whose operations humans might prudently treat with much greater respect. The Anthropocene promises to be a bumpy ride for humanity although following from the analyses in recent scholarship on environmental history, as well as ecological science, it is clear that the complexities of contemporary human vulnerability cannot be reduced simply to natural causes.

The agencies and actors that are predominantly understood to be of prime importance in international relations may not be the appropriate institutional foci for innovative change. Diplomatic accomplishment and international agreements may be a necessary part of the process but at least so far the scope of these has not been up to the task of thinking about how to keep the total scale of human activity within reasonable bounds. Neither do they often work on long enough time scales to grapple with the complexities of climate change, although, that said it is clear that the international negotiations about climate change are understood as an ongoing process rather than a once and for all arrangement. Complex matters of cultural change are crucial; in Hugh Dyer's terms political values cannot be ignored. Ecology may yet provide some valuable terms to rethink contemporary subjectivities, not least because of the importance of connections and the irrelevance of simple distinctions between inside and outside.

The importance of understanding the historical discussion of climate and famine may soon be emphasized if climatological instability becomes more marked as a result of atmospheric change and "global warming". If the Anthropocene turns out to be a period of very intense ENSO events, or one where the deep ocean convection system is disrupted as a result of thermo-haline changes in the North Atlantic, then the famines of a century ago may end up being repeated in holocausts yet to be imagined. While "food aid" may prevent a repetition of at least the worst disasters of the late nineteenth century the possibilities for misery are clear. Quite what is rendering who insecure is not nearly as obvious as people who attempt to enlarge the security agendas of the industrial democracies would like one to believe.

Finally, ecological science is obviously key to the new understandings of planetary systems we are remaking, and while, as Karen Litfin notes, it is beginning to emerge as the basis of political legitimacy in many arenas, not least in climate negotiations it is far from clear that this is anything like enough to engender the more drastic shifts in human subjectivity that at least the French political ecologists argue is necessary to respond to the current crisis.^{138[43]} Science is not the answer in global political terms despite its suggestions of various new vocabularies. Nonetheless such terms as the Anthropocene and no-analogue states may yet be useful in making people stop and think about their own place in the processes that are now remaking planetary processes.

43 ^[43] See Karen T. Litfin "Environment, Wealth and Authority: Global Climate Change and Emerging Modes of Legitimation" *International Studies Review* 2(2) 2000. pp. 119-148.



ELDERLY ROLES IN THE ENVIRONMENTAL DESIGN OF REST HOMES

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Aging is an unavoidable and irreversible process of human life. In this process, people gain longer life spans these days due to the rise in standards of modern life styles and health care. The World Health Organisation (WHO) has stated in their report in 2002 that healthy life expectation might increase by up to 5 to 10 years. As a result of that, societies are going to have a population with a greater ratio of elderly people. With the increase of the elderly population, different demands regarding their residential requirements will also increase. Changes in physiological, psychological and sociological requirements of elderly have affected expectations of environmental organisations.

The number of elderly people, their ratio to total population and average life span is increasing constantly across the whole of Turkey. Because of loss and degeneration about values in life, elderly people's social position with in their own families is threatened by the lack of respect for the elders and changes of attitude. Therefore, more and more elderly people are these days choosing to live on in their own homes alone or into specially designed rest homes. The increase of the elderly population to gether with changes within social family relationships have encouraged many studies on this subject of requirements for the present elderly population around the world and also, now in Turkey. For this purpose, two kinds of questionnaire were given to people aged 65 years and over. One of the questionnaires was applied to 125 elderly people who have lived in their own houses in Diyarbakır. The other questionnaire was applied to 60 elderly people who reside at, Retirement Office 75.Year Rest Home in Ankara. With these two questionnaires 3 main aims have been pinpointed.

These aims are;

- Determining the effects of elderly people's physiological requirements on the size, details and special equipment needs in Rest Homes,
- Determining the effects of elderly people's psychological requirements on the location, type, direction, orders of units and environment in Rest Homes,
- Determining the effects of elderly people's sociological requirements on capacity and variety of social places in Rest Homes.



The results of these questionnaires, which were given to the elderly people who were living in their own houses, were compared to those of the elderly living in Rest Home. Elderly people's physiological, psychological and sociological requirements were determined according to the data. The importance of these requirements was brought up in the environmental organisation. As result of this study, the design criteria of rest home types, location and environmental elements were determined according to the requirements indicated by the Turkish elderly population. Design criteria about horizontal and vertical circulation areas, which includes corridors, stairs, ramps and elevators were detailed. Also, design criteria about bedrooms and social areas were explained. The important points of build components and wet areas which include bathrooms, toilets and kitchens were also explained and determined by the survey questionnaires findings.

1) INTRODUCTION

The diversification of the locational requests together with the increase in the elder population and the changing life conditions, brings forth the necessity of conducting Works regarding the elder users in Turkey. Therefore, the expectations of the elder users in Turkey in the environmental organisation is being determined. The pyhsiological, psychological and sociological requirements of the elder users affect their expectations from the environmental organisation.

The most important point in the design of the rest homes is to form a healthy environmental organisation to meet the pyhsiological, psychological and socio-economical requirements of the elder users, which give the feeling of "being home" to the elder. As a result of the works conducted, the design criteria necessary for the establishment of the environmental organisation have been determined. These criteria are: location selection criteria, building type selection criteria, environmental elements design criteria, . horizontal and vertical circulation design criteria, bedrooms design criteria, wet areas design criteria, social activity areas design criteria.

2) LOCATION SELECTION CRITERIA IN REST HOMES

The most important point to take into consideration in making location selection in rest homes is that there should be an environment that would prevent the elder to split from their former lives. The selected locations should be close to the city center and with less noise. Places with easy accesssion to social services such as parks, libraries, cinemas, malls, schools should be chosen. The elder should easily benefit from public transportation systems. A bus stop nearby the rest home should be designed, and there should be transportation facilitites to easily access the emergency medical centers.

The topograhical slope of the location should be flat in order to minimise the incline and stairs due to the pyhsical problems of the elder. Forrested lands, hills, sea, lake, airplane, ship and train traffic viewed from far away effect the selection of the settlement locations.



3) BUILDING TYPE SELECTION CRITERIA

The main design criteria suggested for the rest homes is that the elder should feel that they are at their homes. Therefore, simple, strong and comfortable solutions should be sought in rest homes, which would make the elder feel at home, rather than luxurious and expensive buildings. Constructing these buildings with low number of floors, if not necessary, shall be a good solution. The buildings should have the capacity of minimum 40-50, and maximum 200 people [1]. In rest homes, building utility area has been determined as 41 m² per person [2].

4) ENVIRONMENTAL ELEMENTS DESIGN CRITERIA

A well designed garden increases the social activities of the elder, effect their psychological status in a positive way and helps them live a calm and peaceful life. Therefore, there should be an open garden for the elder to walk around. These areas should be arranged to protect the physical health of the elder and meet their requirement for sports and rehabilitation.

For the elder to walk around comfortably in the garden, walking paths and and orders should be given importance to. Soft pavement materials are hazardous for the elder using wheelchair and stick. Therefore, the surfaces of the walking paths should be covered with hard materials such as natural stones, concrete, bricks or asphalt.

In researches made on the relations of the elder with the garden it is seen that they like the ornamental trees, and do not adopt the evergreen trees. Thus, trees with leaves changing colours or falling, and colourful flowers should be selected to feel the revival of the nature.

The gardens of the rest homes should be forested as a tree per 20 m² [18]. Arranging greenhouses to provide the elder to plant and take care of the garden.

5) HORIZONTAL AND VERTICAL CIRCULATION DESIGN CRITERIA

Physiological problems that occur with aging, limit the movements of the elder. They especially find difficulties in using the horizontal and vertical circulation elements due to weakness and calcification. Therefore the corridors, stairs, ramps and elevators should facilitate the utilisation of the elder and designed taking the physiological and psychological requirements of the user into consideration.

5.1. Corridors

Corridors, which are the horizontal circulation elements linking the locations, are of great importance in rest homes. Long corridors should be not preferred in order to avoid the elder to get tired and bored. There should be gutter on both sides of the corridor for easy walking. If necessary, there should be niches throughout the corridor, and the seats should be arranged. There can be links set up between the niches and the outer environment.

Absentmindedness that occurs with aging cause the elder to mix the locations and get lost. It is suggested to use different colours in different corridors in order to avoid the elder to mix the places.



The corridors should be wide enough for the easy passage of two wheelchairs and 180 cm wide for maneuvering [8]. In arranging the heating systems, the minimum heat value for the corridors should be 18 °C [5]. The lighting level should be between 100-200 lux lights [6].

5.2. Stairs

In many researches conducted, it has been determined that most elders find it difficult to use especially the stairs. In order to overcome these problems, the physiological problems and anthropometric data of the elder should be taken into consideration when designing the stairs. In stair designs, ordinary stairs with platform should be preferred rather than the revolving stairs. In every 10 stairs a rest platform should be arranged. In case there is sufficient space in platforms, folded seats should be placed. This will provide the elder to rest. The stairs should be covered with non-slipping materials.

The width of the stairs should be 100-110-120 cm for the elder to hold with both hands pull themselves upwards. The steps should be more compressed and wider than thought for the younger people. The best dimension is the arrangement in which the height is 17,5 cm, and the step width is 28 cm [7].

Stair gunnels shall be oval or round shaped for the elder people having difficulties in holding and should be 4-5 cm wide. It should be long enough to exceed the steps from the starting point of the stairs until the end, and continue without any intervals [8]. The corners should be round. There should be a handle although the wall on the stairs other than the existing gunnel. This should have a profile to be easily hold with hand, and should be 4,5-6 cm from the wall to avoid pinching of the hands [17].

Lighting is very important for the elder people to feel safe when using the stairs. A sufficient and proper lighting should be provided, it should not dazzle the eyes and cause shades. The lighting level should be preferred between 100-200 lux lights [6]. Placing colourful profiles forming strong contrast nearby the stairs facilitates the perception of the stairs. The elder people using wheelchair, stick or having walking problems should easily access these places without any obstacles (stairs). Therefore, in places with multi-floors, a ramp or an elevator must be designed nearby the stairs.

5.3. Ramps

One of the horizontal circulation elements used in passing the elevation differences is the incline. Inclines have great importance for the passage of the elder with physiological problems from the elevation differences. Inclines must be designed nearby the stairs, especially in building entrances and gardens. The inclines should have an inclination of no more than 6 % for the elder people using wheelchair and stick. The inclination should be maximum 8 % [8]. The length of the incline should be 6 m for the elder to easily climb and should not exceed 9 m [10].



5.4. Elevators

In rest homes with more than two floors, there should be lifts for the elder people who have difficulties in using the stairs. However, in buildings with two floors, there should also be a lift to use when necessary. The lift cabin should be wide enough so that a wheelchair can fit in, and the inner dimensions should be 100x120 cm [11] [8]. The door of the lift should at least be 90 cm wide, be easily opened by an elder person, and closed automatically [1] [12]. There should be holding points with height of 85-90 cm in all three sides of the lift, and folded seats could be designed [13]. The control buttons should be designed for those using wheelchair. The average heights should be 85 cm from the cabin base, and maximum 140 cm [1]. The closest button to the lift corner should start from 40 cm distance. Sound alert system and cabin phone should be present for emergency cases. Ventilation and lightning of the cabin should be arranged in a way not to disturb the elder [14]. The lightning level should approximately be 100 lux lights [6].

6) BEDROOMS DESIGN CRITERIA

Bedroom is one of the most important locations of the rest homes. The old people spend most of their times there. The rooms are arranged as single, double or for 3-4 people.

Although the single rooms have the advantages of privacy requirement and utilisation comfort, it might have the disadvantage of giving the feeling of loneliness. These rooms should at least be 12 m². There should be a bed with dimensions of 90x190 cm, a shelf, a table and a wardrobe [12].

Rooms for two people are suitable for the married, brothers/sisters and friends getting on well. These rooms should at least be 18 m². There should be two beds with dimensions of 90x190 cm, a table, two chairs and a wardrobe for two people [12].

In rooms for three or more people, there should be three or four beds with dimensions of 90x190 cm, a stand by each bed, a common use table, a chair for each person, and a wardrobe for each [12].

The wardrobes should be high enough for the easy use of the elder people (Figure 1).

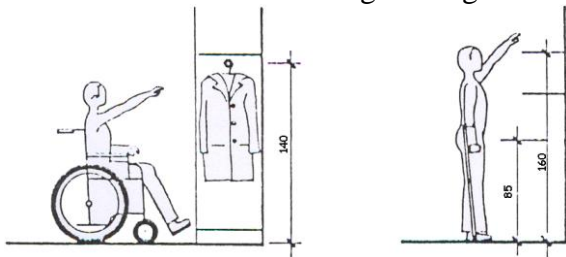


Figure 1. Heights of the Wardrobe [17]



There should be enough space around the beds to easily tidy them (Figure 2).

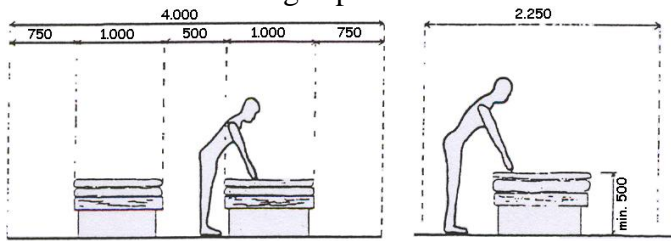


Figure 2. Measures of the empty space around the beds [31]

It is better to use produce materials such as the bed, wardrobe, table, and shelves from wood. The windows of the bedrooms should be put in a way to provide a ventilation preventing the air flow. These windows should also be high enough for the elder people to see outside (Figure 3).

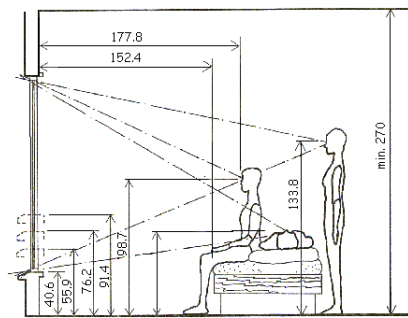


Figure 3. Window and altitude heights in bedrooms [2]

The researches have indicated that the elder people prefer balconies that form link between the bedrooms and the outside world. Therefore the bedrooms should be designed with balconies. However, the balconies should be designed in a way not to block the outside view when sitting inside. The balcony parapets should be 88-90 cm from the balcony surface [1]. A bell system should be installed in bedrooms for emergency situations. The pavement of the bedroom should be chosen from non-slipping, providing easy walk, warm and easily cleaned materials. Rugs, parquet or vinyl materials are suitable for these places. Protective bars should be placed before the radiators and hot water pipes for protecting the elder people. Sharp edges and corners should be avoided. The colours to be used in the rooms should be chosen from lustreless colours due to the psychological problems and psychological requirements of the elder people. The temperature of the rooms should be at least 18 °C during the winter [5]. The general lightning should be between 50-100 lux lights, and the loctional lightning should be between 250-500 lux lights [6]. The socket for the lights should be nearby the beds. Electricity sockets should be 85-90 cm high from the pavement, and the plugs 45-60 cm [8].



7) WET AREAS DESIGN CRITERIA

Wetted areas are the places where mostly slipping and falling events occur in rest homes. In order to prevent these events, design criteria for bathrooms, toilets and kitchens should be applied.

7.1. Bathroom-Toilet

In bathrooms and toilets, the best materials and technology should be used. A bell system should be installed for emergency situations. The minimum temperature should be 20°C for the bathrooms, and 16°C for the toilets [5]. The electricity sockets should be external, and there should be a night light next to the socket. The general lighting should be 100-200 lux, and the locational lighting before the mirror should be 250-500 lux lights [6].

Toilets and bathrooms should be wide enough to facilitate the easy passage of the people using wheelchair and crutch and meet the requirement of dressing and drying (Figure 4). Pavement covers should be selected from non-slipping materials even when wet. The doors should be opened towards outside or have sliding feature. There should not be threshold before the doors, the flow of the water outside should be prevented with the inclination of the pavement.

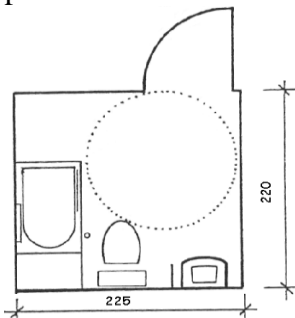


Figure 4. Bathroom dimensions for the elder [15]

The bathrooms should not be attached to the external wall. There should be bathtub and basin or similar equipment for gathering water. In case a bathtub is built, there should be a passage for 50 cm. The dimensions of the bathtub should at least be 156x60 cm [8] (Figure 5).

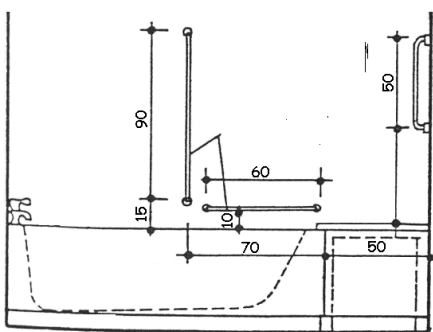
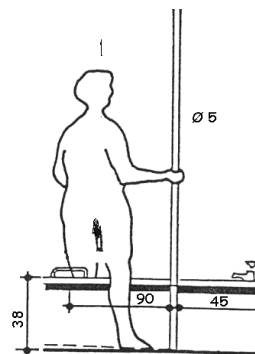


Figure 5. Bathtub dimensions for the elder [15]





A 40 cm-high folded seat should be designed in the bathtubs [16]. This seat will especially facilitate washing the feet and having bath. One or two handles should be enough for entering and leaving the shower. The handles should have the diameter of 2-2,5 cm, and made of stainless metal [14].

For common use areas, a toilet should be built for each group of 6 people [8]. The toilets should be maximum 16 m away from the living room and bedrooms [14]. Height of the closet should be 43 cm high from the finished pavement. There should be handles to facilitate the easy use of the closet and paper towel holders should be installed nearby the washbasins (Figure 6).

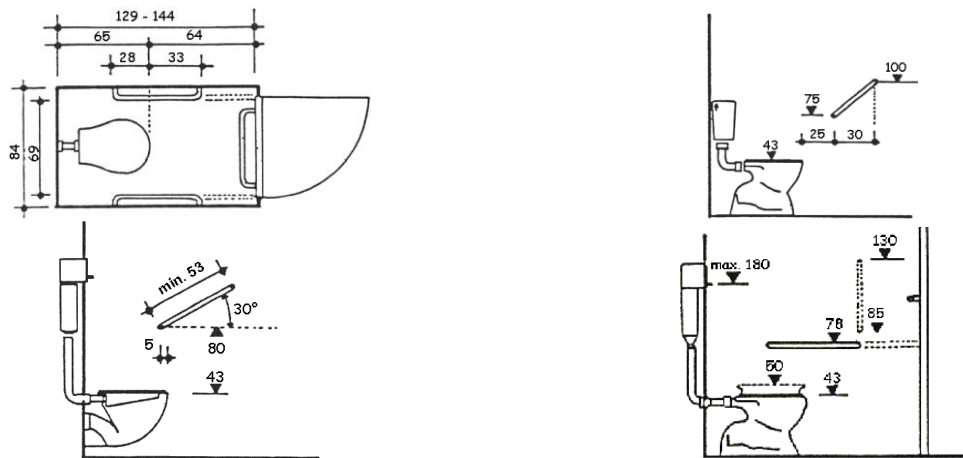


Figure 6. WC design for the elder [17] [14]

The washbasins should be installed in a way to approach with wheelchair. The top part of the washbasin should be 80-85 above the finished pavement elevation [1].

7.2. Kitchen

In rest homes, there should be a main kitchen for common dinings, and small kitchens or tea offices in the floors for the usage of the elder people.

- Main Kitchen: The place for preparing common meals. These places should be at the same floor with multi-purpose halls [18].
- Floor Kitchen (Tea Kitchen-Tea Office): Places on the same floor with the bedrooms where the elder can use for cooking tea, coffee, and etc., wash their dishes whenever they want [12]. These kitchens could be linked to the main kitchen with a small lift.

The type and surroundings of the kitchen sink, fridge and the cooker, which form the three main equipments in a kitchen is a main indicator for the practicability of the kitchen. It is suggested to arrange the surrounding of the working triangle as 360-660 cm, and not exceed 780 cm. There should be 120-180 cm between the sink-cooker, 120-210 cm between the sink-fridge, and 120-270 cm between the fridge-cooker [19].



The dimensions of the working stands and cupboards in floor kitchens, which will generally be used by the elder people, should be in compliance with the anthropometric sizes of the elder people. Underneath of the working stands should be emptied for the accessing this place with a wheelchair. The depth of the stands should be 60 cm, and the height should be at least 65 cm [16]. The frequently used shelves should at least be 163 cm high from the finished pavement elevation [18]. In the figure below the heights of the stands and shelves designed according to the anthropometric sizes of the elder people are shown (Figure 7).

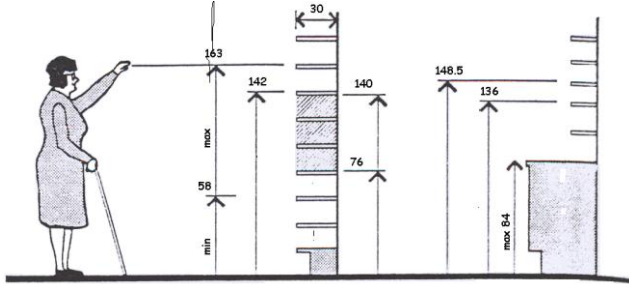


Figure 7. Heights of the stands and shelves [18]

The ideal temperature for the kitchens is 21 °C. The minimum temperature should be 18 °C [5]. The lightning should be bright enough not to cause dazzling. The general lighting level is preferred to be between 125-250 lux lights, and the locational lighting level for above the stands is preferred to be between 250-500 lux lights [6].

8) SOCIAL ACTIVITY AREAS DESIGN CRITERIA

Social activity areas are communication centers where the elder people are gathered, dine, involve in various activities and meet with their visitors. These areas include resting locations, restaurants, cafeterias, various hobby rooms, shopping units, entertainment, meeting, cinemas, multi-purpose halls and the administration unit of the complex.

8.1. Dining Halls

Dining hall is a place where all the elder people in the rest home gather and dine together. This place should be in a central location to facilitate and have links to the living rooms and kitchen. It should be designed to be used as a multi purpose hall when required. It is possible build a large hall for the whole rest home whereas it possible to design a seperate dining hall in each floor. The tables in dining hall should not have the capacity of more than 6 people. Tables and circulation areas should be suitable for wheelchair sizes and prevent collide (Figures 8, 9). The average area required per person is 2.6 m² [2].

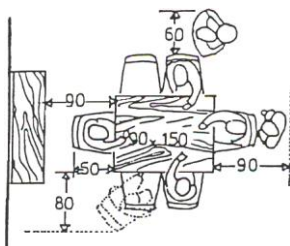


Figure 8. Dimensions of a dining table [14]

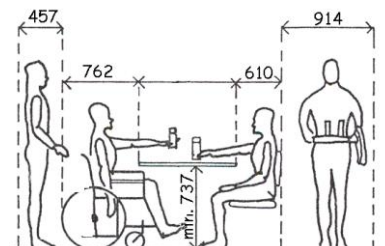


Figure 9. Dining hall utilisation dimensions[2]

Window heights should be designed in order not to prevent the outside view for the elder people when dining inside (Figure 10).

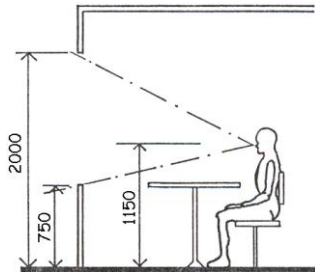


Figure 10. Dining hall window height [2]

8.2. Living Rooms

Living rooms should be designed in a way to facilitate the elder to sit together and watch TV. These rooms should be in each floor. One of the living rooms must be in connection with the dining hall. The purpose is that the elder people spent time together before and after meals and strengthen their social relations. The closeness of the living rooms to the scene, entrance of the building and main circulation areas will give the opportunity to the elder to spend more pleasant time .

In case the physical conditions of the building is suitable, sitting places viewing the scene can be designed in addition to the living rooms. Living rooms should be designed to facilitate the groups of 4-10 people to sit together. The area required per person is 3.6 m^2 . The heights of the window should be designed in a way not to block the outside view when sitting inside (Figure 11) [2].

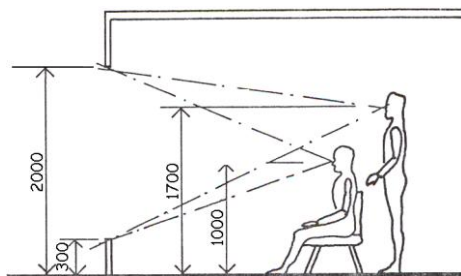


Figure 11. Dining hall window height [2]

The general lighting level should be between 50-100 lux lights in order to facilitate the elder people to see each other and watch TV. The regional lighting should be between 500-1000 lux lights for detailed functions such as reading [6]. The minimum temperature value in dining rooms should be 21°C [5]. Heating systems should be designed taking this value into consideration.



8.3 Hobby Rooms

Hobby rooms in the rest homes are places where the elder spend their times, develop special interests, and contribute to production. These rooms should be furnished with materials to draw pictures, make ceramics, and etc. A fine lighting is necessary for activities in these rooms. The lighting should be 500 lux lights to facilitate the elder people to work easily [6].

9) STRUCTURE COMPONENTS DESIGN CRITERIA

As in the function areas, structure components should also be designed to meet the requirements of the user. Doors, windows and furnitures should be designed to facilitate the easy usage of the elder person.

9.1 Doors

Doors which provide the passage between locations are very important. The doors in all locations especially in the bathrooms should be opened towards outside for an emergency situation. Door locks should be selected to be opened from outside.

Door widths should be designed for those using wheelchair and crutch and not narrower than 90 cm. Slamming doors and glass doors are not suggested due to the visual weaknesses of the elder people. In case glass doors are preferred, the glass doors and middle sections should be marked with a coloured tape 20 cm-wide, and placed horizontally at least 100 cm high from the ground.

In photocell doors, opening and closing times of the door should be arranged to provide the elder people to pass from the door. Sliding doors are not preferred for pinching the fingers and the negative performance in heat insulation. However they can be used if necessary. Thresholds must be avoided to prevent the elder people fall and facilitate the easy passage with wheelchair.

9.2 Windows

Windows should meet the requirements of the elder people since they link the location to the outer world. The elder should be able to see outside in every situation. However when providing this, designing the window so low is not appropriate for safety.

Using wider windows rather than narrow ones, reducing the brightness and distributing the light into the room better is necessary. In case the window is opened towards inside, this could cause accidents. Opening 180° shall provide a safer usage [1]. Window handles should facilitate the easy handling of the elder. The height from the ground can differ between 90 and 140 cm depending on the approach to the window [51].

Remote control devices can be installed to windows in order to use when necessary [16]. Since the elder people love flowers, window sill shall be designed wide enough to grow plants.



10) CONCLUSION

In the research, the results of the questionnaire applied on the elderliving at their homes and living in rest homes are compared. According to the data obtained, the physiological, psychological and sociological requirements of the elder have been determined, and the importance of these requirements in environmental organisation has been stated. As a result of the study, it has been determined that in Turkey;

- physiological requirements of the elder effect the dimensions and details of the locations, and hardwares,
- psychological requirements of the elder effect the location, type, direction of the rest homes, and arrangement of the units and environment,
- sociological requirements of the elder effect the capacities of the rest homes, and diversity of the social locations.

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RESTRICTIONS IN DAILY LIVING ACTIVITIES AND SOCIAL ISOLATION STATUS OF ELDERLY LIVING IN ANKARA PROVINCE GÜLSEREN DISTRICT

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AIM

Determining the restrictions in daily living activities and social isolation status of people older than 65 years old and living in Gülseren District is aimed in this study.

METHOD

This is a cross-sectional study. Data were collected from 137 people more than 65 years old and living in Gülseren District via a standardized questionnaire (Coverage 93%).

RESULTS

Of the participants, 51.1% were women, 54.8% were married, 62.0% were between 65-69 age group. According to their social isolation evaluation, 9.7% of them live alone and 26.3% of them don't have visitors except special days. There is no significant relation between gender and being called or visited in special days ($p>0.05$). Women are found more dependent in their daily living activities compared to men ($p<0.05$). Both men and women are more dependent in out of house activities according to indoor activities. Dependency increases with age. Of the participants, 18.2% stated that they don't go out alone. When spare time activities were asked, men prefer out of house activities like going coffee stalls, and roaming around; women prefer having more time at house.

CONCLUSION and RECOMMENDATIONS

Inside and outside environmental regulations will be of use for increasing the participation to social life and quality of life of elderly.

Additionally, activities targeting to make elderly have their spare time in community should be conducted. Such activities would support elderly to live their social life.

Key words: *Elderly, social isolation, daily living activities.*

INTRODUCTION

Improvements in science and technology increased the early diagnosis and treatment likelihood of diseases. Environmental and sheltering ameliorations added to these improvements, increases mean life expectancy in 20th century. With the increase in life expectancy, aging became an important problem for the modern world.

The term "old" was used to be used for 60 years and older, now it's more common to use it for 65 years and older (1).



The population of 60 years and older group in 2000, 600 millions, is expected to be 1.2 billion in 2025 and 2 billions in 2050. Portion of 60 years and older population in the whole population in 1998 was 10% and expected to be 15% in 2025. In the next 50 years, elderly population is expected increase fourfold and this increase is especially expected in developing countries (2). Recently two thirds of the elderly live in developing countries, and this rate is predicted to be 75% in 2025. Right along with this, 80 years and older group is rapidly increasing (3). Societies with more than 10% 65 years and older population are considered as “old populations” (4). Nearly seven percent of Turkey’s population is 65 years and older (5).

Aging is a physiological, inevitable process. There are major amendments in the organism in this process (4). With the increase in age, physiological function capacity decreases. This makes elderly more dependent and weakens to cope with diseases and social and environmental changes (1). Consequently, elderly people become more vulnerable to environmental conditions (6). After the “World Geriatrics Congress” which was held on by United Nations in 1982, the first international intervention plan about aging was displayed. This action plan focuses on a safe environment for elderly (7).

Aging brings new health problems like chronic diseases, visual and auditory disabilities ect. Limitations of daily living activities make elderly more dependent to others partially or completely. Nursing requirements and lack of social participation for elderly arise as concomitant problems.

This study aims to determine the problems in daily living activities and social isolation of 65 years and older people living in Gülseren district in Gülveren Health Center region in Ankara.

METHODS

This is a cross-sectional study. Totaly 137 people were reached from 147 people older than 65 years, living in Gülseren district, randomly selected and one of five districts in the catchment area of Gülveren Health Center Region in Ankara, with coverage of 93%. Data were collected via a standardized questionnaire with face to face interview method. Relations between variables assessed with chi-square test.

RESULTS

Of the participants, 51.1% were women, 58.4% were married, 41.6% were illiterate (men 9.0%, women 77.1%) and 62.0% were between 65-69 age group. Of the participants, 13.4% of males and 37.1% females don’t have health insurance respectively (Table 1).



Characteristics	n	%
Sex		
Male	67	48,9
Female	70	51,1
Age		
65-69	85	62,0
70-74	38	27,7
75-79	9	6,6
80-84	3	2,2
85-89	2	1,5
Marital status		
Married	80	58,4
Widow/er	51	37,3
Divorced	5	3,6
Single	1	0,7
Educational level		
Illiterate	57	41,6
Literate	32	23,4
Primary school	33	24,1
Secondary school	8	5,8
High school	7	5,1
Health insurance		
Yes	99	72,3
No	38	27,7

Table 1: Socio-demographic characteristics of participants (Ankara, 2000).

N=137

Increased health insurance is together with increased education level, but no significance was found ($p>0,05$).

Of the participants, 60.6% had at least one chronic disease. The most common diseases were cardiovascular system diseases (49.4%).

Of the participants, 9.7% were living alone, 26.3% have visitors only on special days and visitors are mostly their children (75.5%). There were no significant difference between men and women among being visited and called on special and other days ($p>0.05$) (Table 2).



Characteristics	n	%
People they are living with		
Alone	13	9,7
Spouse	26	19,4
Spouse and children	28	20,1
Children	4	2,2
Spouse, children and children's family	28	20,1
Children and children's family	38	28,4
Being visited		
Yes	101	73,7
No	36	26,3
Being visited on special days		
Yes	131	95,6
No	6	4,4
Being called by phone		
Yes	106	71,0
No	31	29,0
Being called by phone on special days		
Yes	123	88,6
No	14	11,4

N=137

Table 2: Some characteristics concerning social isolation of the participants (Ankara, 2000).

When dependence in the daily activities is asked, 28.5% of male and 7.4% of female were found dependent. This difference was found statistically significant ($\chi^2=14.4$, $p<0.05$).

On considering partially dependents as dependent, men are more independent in their daily living activities. This difference is statistically significant for bathing, dressing, cooking, transport, transfer and shopping ($p<0.05$) (Table 3).

* Row percentages are given.

	Independent ¹		Partial dependent ²		Dependent ³	
	Male	Female	Male	Female	Male	Female
Bathing	91,0	74,3	7,5	25,7	1,5	-
WC	97,0	94,3	1,5	5,7	1,5	-
Dressing	92,5	77,1	6,0	22,9	1,5	-
Eating	95,5	88,6	3,0	11,4	1,5	-
Cooking	83,6	68,6	11,9	21,4	1,5	10,0
Transferring ⁴	95,5	75,7	3,0	21,4	1,5	2,9
Transporting ⁵	89,6	61,4	7,5	25,7	3,0	2,9
Shopping	89,6	58,6	6,0	30,0	4,5	11,4

Table 3: Dependency in daily living activities of the elderly (%*) (Ankara, 2000).



Male= 67

Female =70

¹ Independent: can do the related activity when necessary

² Partial dependent: can do the related activity with the assistance of another person

³ Dependent: Can't do the related activity

⁴ Transferring: Getting in and out of bed, sitting down and standing up to a chair.

⁵ Transporting: Going out by using public transport vehicles and getting in and off these vehicles.

Dependency increases with age. When partially and completely dependents are assessed together; dependency rates in 65-69, 70-79 and 80 and over age groups are 16.4%, 49,6% and 100.0% respectively.

Dependency rates increase both for women and men concerning outdoor activities according to indoor activities.

Of the participants, 27.0% can't walk without backing, 63.5% had visual and 19.9% had auditory problems.

12.8% of the participants indicated that they couldn't leave their houses alone.

It's determined that men read newspapers more than women ($p < 0.05$).

The spare time activities of the participants were assessed and men found more to go to café shops, women to neighbour visits (Table 4). Mostly preferred outdoor activities for men are going to café shops and promenade. Women mostly spend their spare time at home.

Activities	Male (n=67)		Female (n=70)	
	n	%	n	%
Going to café shops	41	61,2	-	-
Promenade	8	11,9	8	11,4
Neighbour visits	7	10,4	26	37,1
Watching television	6	9,0	7	10,0
Listening to music	1	1,5	1	1,4
Reading book	1	1,5	-	-
Handwork/housework	-	-	14	20,0

Table 4: Distribution of spare time activities of the participants according to their sex (Ankara, 2000).



DISCUSSION

Of the participants, 27.7% don't have a health insurance security. In a study that represents Ankara province, this rate was found as 26.7%. Whereas the total coverage of elderly in a health insurance system indicates as an important tool for providing access to health services for elderly in "Aging 2002 – International Action Plan" (2).

Most of the participants are found to be independent in their daily activities. But still the nearly $\frac{1}{4}$ of the population is dependent. This study betrays that 28.5% of the women are dependent. In a study conducted in Malatya province dependency rate for women was found to be 10.2% (8).

According to our findings, men seem to be more independent when compared to women in daily living activities. This difference was found significant for bathing, dressing, cooking, transport, transfer and shopping ($p < 0.05$). Findings of a study that represents Ankara province indicates that bathing, dressing, cooking, transport, transfer and shopping is significant between sexes like our study (9).

Nearly one over five of the participants' could not leave home alone. However arrangements on physical conditions can increase elderly's social participation by ensuring them to go out. Of the participants 27.0% couldn't walk without backing, 63.5% had visual problems, 28.5% had auditory problems. These results are similar with Ankara representative study which indicated walking problems in 24.3%, visual problems in 57.4% and auditory problems in 28.5% (9).

Interventions targeting issues that will make life easier for elderly and decrease their dependency status will increase their quality of life. These interventions can be both in house level and outdoor surroundings (streets, shopping malls, transport systems) of the elderly.

Lots of old people do not go out to avoid from falling. Stair designs in the outdoor should be revised and ramps should be used instead of these. Slipping material should not be used in front of entrance of buildings, doorsteps should have appropriate height and house locks should be designed easy to use (6). Appropriate banisters should be assured, elevators have to be in operating condition, special arrangements should be provided for wheelchair users, sidewalk heights should be favorable, visual and auditory signs must be used for disabled ones. Appropriate lightening is essential both for indoor and outdoor, this will make elderly go out more frequently.

People prefer public transport more when they get older (2). So, arrangements for public transport vehicles would be beneficial. Home health care services have great importance for improvement of these peoples quality of life, since some of the dependent elderly live alone.

Elderly, especially housewives, don't participate to social activities frequently. Most of their activities are limited to house and they are stagnant. This makes life more sedentary for elderly, isolates them from society and prepare background for mental problems. On this account social activity centers should be projected to elderly which can be easily reached.



CONCLUSIONS

Indoor and outdoor implementations will be beneficial for increasing social participation and quality of life of elderly.

Furthermore interventions aiming to help elderly spend their spare time within society are essential. Such interventions will support old individuals to sustain their social life.

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ENVIRONMENTAL RISK PERCEPTION OF KECIOREN MUNICIPALITY WORKERS

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BACKGROUND AND AIM

Environmental factors have direct and indirect effects on human health (1). Living and non living organisms have a continuous relation between each other (2). Municipality workers are supposed to be aware of environmental risk factors like all individuals in the community (3). Because of this, it's important to determine the environmental risk perception of municipality workers.

In this descriptive study, it's aimed to determine some socio-demographic characteristics and environmental risk perception of Kecioren municipality workers.

MATERIALS AND METHOD:

Universe of the study is composed from 1931 workers from Kecioren Municipality. Workers from health services department were excluded from the study since they supposed to have better perception on environmental risk so can tend to false results. Finally; 24 workers from gardening department, 25 workers from municipal police department, 47 workers from technology department, 59 workers from accounting department, 6 workers from education department, 58 workers from development department, 12 workers from estate department, 11 workers from data processing department, and 7 workers from human resources department were reached and totally 249 workers were included in to the study.

Data were collected via a structured questionnaire composed from two sections; 12 questions for socio-demographic characters and 44 questions for environmental risk perception (totally 56 questions) by face to face interview method. All necessary permissions were obtained from Kecioren Municipality and informed consents from the recruits.

Relations between variables are assessed with chi-square test.

RESULTS:

Mean age of the participants were 37.34 ± 7.31 (Min= 21, Max= 60). Of the participants, 62.2% were male, 44.8% were high school graduates, and 77.9% were married. Most participation was from accounting and development departments. Of the participants, 77.1% have children and of the parents, 40.3% have two children. Of the participants, 51.9% were graduated from primary school, 34.5% from high school and 13.6 from university (Table 1).

Of the municipality workers, 53.9% are current smokers, 9.0% are quitters and 37.1% have never smoked. These rates are 51.3%, 21.7% and 27.9% for men respectively (Table 2).



Characteristics	n	%
Age (n=247)		
≤29	36	14.6
30-34	54	21.8
35-39	56	22.7
40-44	61	24.7
≥45	40	16.2
Sex (n=249)		
Men	155	62.2
Women	94	37.8
Education level (n=248)		
Literate	3	1.1
Primary school	21	8.5
Secondary school	19	7.7
High school	111	44.8
University	94	37.9
Marital status (n=249)		
Married	194	77.9
Single	41	16.5
Divorced	11	4.4
Widow	3	1.2
Having children (n=249)		
No	57	22.9
Yes	192	77.1
1 child	73	38.2
2 children	77	40.3
3 children	31	16.2
4 and more children	10	5.3

Table 1. Some socio-demographic characteristics of municipality workers.

Distribution of environmental risk perception of the participants according to sex is given in Table 3.

The education level of the participants was grouped as secondary school and below, high school and university. Majority of all of these three groups indicated; smoking, environmental tobacco smoke, ozone depletion, global warming, bulk food, food additives, genetically modified food, and getting pregnant before 18 years old as harmful. Sun bathing was found to be little harmful by 48.5% of the high school and below graduates, seriously harmful by 53.8% of the high school graduates and 58.0% of the university graduates (Table 4).

Of the married participants, 83.2% stated environmental tobacco smoke as seriously harmful. On the contrary, this rate was dramatically low for never married participants. Staying in an unventilated room, staying in a room heated by stove and sleeping in a room with more than three people was stated as seriously harmful both by married and single participants.



Smoking status	Men		Women	
	n	%	n	%
Smoking status (n=241)				
Current smoker	78	51.3	48	53.9
Quitted	33	21.7	8	9.0
Never smoked	41	27.0	33	37.1
Duration of smoking				
Current smokers (n=78)				
≤9 years	19	29.2	12	30.8
10-14 years	10	15.4	14	35.9
15-19 years	13	20.0	5	12.8
≥20 years	23	35.4	8	20.5
Quitters (n= 33)				
≤9 years	11	40.7	4	66.6
10-14 years	5	18.6	-	-
15-19 years	9	33.3	1	16.7
≥20 years	2	7.4	1	16.7

Table 2. Smoking status of the municipality workers

There is a statistically significant relation between having children and perceiving getting pregnant before 18 years old as an environmental risk ($p=0.002$). there was no significance between other environmental risk factors and having children. Environmental tobacco smoke and alcohol intake was stated harmful %80.0 by both ones with children and others. Mobile phones were found to be harmful by more than half of the ones without children.



Tablo3. Distribution of environmental risk perception according to sex of municipality workers.



Environmental risk factor	Men					Women				
	Non	Little	Serious	No idea	Total	Non	Little	Serious	No idea	Total
	%	%	%	%	n	%	%	%	%	n
Smoking	0.7	5.3	88.8	5.3	152	-	4.3	93.6	2.1	94
Environmental tobacco smoke	2.0	15.8	77.0	5.3	152	-	17.0	78.7	4.3	94
Staying in an unventilated room	7.2	25.7	93.8	3.3	152	3.2	19.1	74.5	3.2	94
Staying in a room heated with stove	14.5	53.3	19.7	12.5	152	13.8	45.7	26.6	13.8	94
Outdoor air pollution caused by factories	1.3	11.8	82.2	4.6	152	-	4.3	91.5	4.3	94
Outdoor air pollution caused by car exhaust	1.3	16.4	78.9	3.3	152	-	8.5	88.3	3.2	94
Ozone depletion	-	2.6	86.2	11.2	152	-	2.1	92.6	5.3	94
Global warming	-	8.6	80.8	10.6	151	-	7.4	81.9	10.6	94
Climate changes	2.6	32.5	54.3	10.6	151	1.1	26.6	60.6	11.7	94
Chemical pollution in water and food sources	0.7	4.6	90.1	4.6	151	-	3.2	93.6	3.2	94
Water pollution	-	4.0	92.7	3.3	151	-	5.3	92.6	2.1	94
Chemicals in drinking water	9.9	25.8	43.0	21.2	151	3.2	26.6	48.9	21.3	94
Bacteria in drinking water	0.7	11.3	51.5	6.6	151	-	12.8	80.9	6.4	94
Bulk food	2.0	23.2	70.9	4.0	151	-	9.6	85.1	5.3	94
Food additives	1.3	19.9	69.5	8.3	151	-	12.8	78.7	8.5	94
Malnutrition	-	23.2	71.5	4.6	151	-	13.8	79.8	6.4	94
Genetically modified foods	0.7	9.3	74.8	15.2	151	-	4.3	86.2	9.6	94
Radiation exposure of food	-	2.0	90.1	7.9	151	-	2.1	93.6	4.3	94
Insect presence near foods	-	7.3	88.7	4.0	151	-	3.2	95.7	1.1	94
Insecticides	6.1	32.7	46.9	14.3	147	8.5	26.6	48.9	16.0	94
Industry originated soil pollution	0.7	8.8	73.5	17.0	147	-	10.6	79.8	9.6	94
Mercury containing cells	2.0	15.6	63.9	18.4	147	1.1	9.6	55.3	34.0	94
Lack of sheltering	2.0	14.3	70.7	12.9	147	-	3.2	84.0	12.8	94
Sleeping in a room with more than three people	6.1	34.7	49.7	9.5	147	3.2	30.9	50.0	16.0	94
Mobile phones	6.1	48.3	39.5	6.1	147	4.3	39.4	5.7	10.6	94

□



Table 3 Cont.

Sun bathing	6.1	40.8	40.8	12.2	147	3.2	27.2	58.5	10.6	94
Alcohol use	2.0	16.3	76.2	5.4	147	3.2	11.7	77.7	7.4	94
Stress	-	17.7	76.2	6.1	147	-	5.3	89.4	5.3	94
Illicit drugs	0.6	1.4	94.6	3.4	147	-	1.1	93.6	5.3	94
Being pregnant before 18	9.5	17.0	55.1	18.4	147	4.3	13.8	68.1	13.8	94
Increase in motor vehicles	6.8	70.9	59.2	8.2	147	2.1	19.1	68.1	10.6	94
HIV/AIDS	1.4	1.4	91.8	5.4	147	-	1.1	91.5	7.4	94
Earthquakes	3.4	6.1	84.4	6.1	147	-	3.2	92.6	4.3	94
Sedentary life style	-	20.4	73.5	6.1	147	-	9.5	86.2	4.3	94
Living close to high-tension lines	0.7	16.3	75.5	7.5	147	-	7.4	81.9	10.6	94

Table 4. Distribution of environmental risk perception according to education level of municipality workers.

Environmental risk perception	Education level		
	Secondary school and below %	High school %	University %
Smoking	(n=36)	(n=107)	(n=92)
Not harmful	-	0.9	-
Little harmful	5.6	3.7	6.5
Seriously harmful	94.4	95.3	93.5
Environmental tobacco smoke	(n=35)	(n=106)	(n=92)
Not harmful	5.7	0.9	-
Little harmful	14.3	17	18.5
Seriously harmful	80	82.1	81.5
Ozone depletion	(n=30)	(n=102)	(n=91)
Not harmful	-	-	-
Little harmful	6.7	1.0	3.3
Seriously harmful	93.3	99.0	96.7
Global warming	(n=32)	(n=95)	(n=91)
Not harmful	-	-	-
Little harmful	15.6	8.4	7.7
Seriously harmful	84.4	91.6	92.3



Table 4 Cont.

Bulk food	(n=37)	(n=106)	(n=90)
Not harmful	-	2.8	-
Little harmful	18.9	17.9	20.0
Seriously harmful	81.1	79.2	80.0
Food additives	(n=35)	(n=99)	(n=88)
Not harmful	-	2.0	-
Little harmful	8.6	18.2	23.9
Seriously harmful	91.4	79.8	76.1
Genetically modified foods	(n=34)	(n=93)	(n=85)
Not harmful	-	1.1	-
Little harmful	8.8	7.5	9.4
Seriously harmful	91.2	91.4	90.6
Sun bathing	(n=33)	(n=91)	(n=88)
Not harmful	6.1	8.8	2.2
Little harmful	48.5	37.4	39.8
Seriously harmful	45.5	53.8	58.0
Being pregnant before 18	(n=31)	(n=89)	(n=80)
Not harmful	3.2	10.1	10.0
Little harmful	25.8	11.2	25.0

CONCLUSION

Generally men and women have different sphere of interests so they supposed to have differences in environmental risk perception. Nonetheless without a statistically significance; food additives, bulk food, genetically modified foods, insecticides, pesticides, getting pregnant before 18 are perceived more harmful by women.

Education level was supposed to have impact on risk perception. Smoking, environmental tobacco smoke, ozone depletion, global warming, food additives and genetically modified foods do not influenced by education level. The high rate of perceiving these factors as harmful can be affiliated to the origin of knowledge about these risk factors. Mostly media is the main knowledge source rather than schools. Of the high school and university graduates, 10% don't perceive getting pregnant before 18 indicates the lack of these issues in education system. This result reminds that this issue is accepted as normal in society. In accordance with the results of this study, providing a municipality library which will give opportunity to reach information about environmental risk factors will be beneficial. Additionally, education and support programs about harms of smoking and cessation will increase the sensitivity and knowledge on this issue. Another important issue is; what the term 'environmental risk' express'. Additional surveys should be conducted to determine the expression of "environmental risk" to the municipality workers.

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PHYSICAL FITNESS IN RURAL CHILDREN COMPARED WITH URBAN CHILDREN IN NORTH CYPRUS

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In a modern world it is vital that the promotion of sport and exercise is compatible with environmental and public health outcomes. This study aims to investigate the effects of environmental factors on physical fitness in rural and urban children. To reveal the differences between physical fitness in prepubescent children of Turkish Cypriot population 3955 EUROFIT test results of 9-11 years old male junior school children from all 90 schools of five different district (Lefkoşa, Güzelyurt, Magosa, Girne ve Karpaz) of North Cyprus were collected. Height and weight measurements, test for skinfold thickness, flamingo balance test, plate tapping, sit-and-reach test, standing broad jump, handgrip strength, sit-up test, bend arm hang test, 10m*5 sprint and shuttle run tests were comprising 12 EUROFIT tests. Analysis of obtained points has shown that children with 90th percentile of their test results and above were fit enough to be successfully engaged in sports activities, which vary with age and district, whereas those children with data below 23rd percentile had risk of facing with health problems in the future. Assessment of age differences of test results also indicated different impact of this factor on health and fitness levels of children. The results showed that body mass index and skinfolds thickness were higher in the urban children ($p<0.05$). In cardiopulmonary and motor fitness, differences were found between groups. In contrast, flexibility and muscle endurance were significantly higher in the rural children. The children living in the urban areas were more inactive and obese, which resulted in a decrease in their flexibility and muscle endurance fitness.

Abbreviations: A1, Magosa; A2, Girne; A3, Güzelyurt; A4, İskele; A5, Lefkoşa.....SAR, sit and reach; body mass index (BMI), hand grip (HGR), sits-up (sup), Flamingo balance test (FLB), standing broad jump (SBJ), Shuttle run test (SRT), sit ups (SUP), Sprint test (ST), skin fold total (SKFT) plate tapping (PLT) sit and reach test (SAR),

Keywords: *EUROFIT, children's health, fitness, percentile, rural, urban*

The health-related benefits of physical activity are well known. Regular physical activity decreases the risk of health problems, such as coronary heart disease, hypertension, and obesity. Participation in physical activity and sport can promote social well-being, as well as physical and mental health, among children and adolescents (Nalan, 2006).

Living (Tisimeas, 2005) in areas distinguished by population size can be associated with differences in, inter alia, eating habits, access to sport facilities, and opportunities for physical fitness activities. However, it is not entirely clear whether such factors can affect aspects of body composition and therefore, physical fitness.



While some data indicated that urban children have more body fat than their rural counterparts, other data are in strong disagreement. Contradictory reports have also been published in relation to physical fitness parameters in children living in urban and rural settings. In some cases, no differences have been identified in a range of fitness and motor skill measures between children from urban and rural areas (Özdirenç, 2005; Tsimeas, 2005). Therefore, the aim of this study was to investigate physical fitness in relation to urban and rural Turkish Cypriot children.

METHODS

Subjects and setting:

3495 3rd, 4th and 5th grade boys from 90 Turkish Cypriot Public Elementary Schools participated the EUROFIT tests. The districts that students contributed to test was Lefkoşa, Güzelyurt, Girne, Magosa and Karpaz. Lefkoşa, Magosa and Girne can be urban areas, Güzelyurt and Karpaz rural areas. During the study they continued to receive their usual physical education. Informed consent was obtained from the parents and guardians of the children. To be included in analyses of a fitness variable, subjects were required to have data at all twelve measurements for that variable.

Measures:

Subjects were assessed using the EUROFIT TEST (www.coe.int) protocol during February and May 2005 for grades three through five. Trained research assistants administered the tests to groups of twenty to thirty children during morning and evening hours. All measures were conducted on school playgrounds which included a parket playing field, chin-up bar, and gymnasium mats. The EUROFIT test was chosen because of its ease of administration to large numbers of subjects and its choice of reliable and valid fitness measures. Twelve components were evaluated: body composition (bmi), cardiorespiratory endurance, muscle strength and endurance, and flexibility.

Body composition and fat distribution were assessed using two methods: 1) sum of triceps and calf skinfolds, 2) body mass index (BMI).

Interobserver reliabilities were determined at each of the two measurement groups and ranged from 0.92 to 0.97 for height, 0.90 to 0.98 for body mass, 0.74 to 0.86 for triceps skinfold, 0.78 to 0.91 for calf skinfold. The validity of estimating percent body fat in children is good for triceps skinfold, sum of skinfolds, and circumferences, and fair for BMI, with an expected error of 3 to 4% (22). Skinfolds were measured using calibrated Holtain calipers. Triceps skinfold was measured at the midpoint and back of the upper right arm. Calf skinfolds were taken on the inside of the right leg with the knee bent at a 90° angle. The skinfold was measured at the maximal girth of the calf. Three measures were taken at each skinfold site and averaged. Averages of the two sites were then summed. BMI (body mass (kg)/height (m)²) was calculated using weight and height measures. Body mass was measured with calibrated digital strain gauge scales. Height was measured on a level surface against a flat wall using a folding carpenter's ruler and a right angle. Participants stood with their backs to the ruler while the right angle was positioned on the top and center of the head. Both height and weight were measured without shoes.



Waist and hip circumferences were taken from a lateral view using a flexible metal measuring tape. Waist circumference was taken at the umbilicus and hip circumference was taken at the widest part of the hips and buttocks. Measurements were taken only on children who wore light clothing.

One of the most commonly used field tests of hamstring flexibility in children is the sit-and-reach test (29). It has one of the highest test-retest reliabilities for measures of flexibility ($r = 0.89$ to 0.97) (34). Maximum distance reached on a standardized sit-and-reach box (30 cm) was used to assess hamstring flexibility. With legs fully extended, children were asked to reach forward four times and hold position of maximum reach. Research assistants recorded furthest reach to the nearest cm. There are a lack of validity studies on the modified sit-up test (13) as a measure of abdominal strength and endurance in children. However, reliability of the modified sit-up is generally high, ranging from 0.77 to 0.94 for boys and girls (34). In adults Ball (2) found low to moderate correlations with abdominal strength measured by one-repetition maximum (1-RM) of trunk flexion ($r = 0.57$) and with abdominal endurance measured by the number of repetitions completed at 60% 1-RM ($r = 0.40$).

In the present study abdominal muscle endurance was measured by the number of bent-knee sit-ups completed in 1 min. Participants were instructed to keep arms folded across the chest, place feet about 38 cm from the buttocks, touch elbows to thighs on the upward portion, and touch midback to mat on the downward portion. For testing purposes the participants' feet were held down by another participant and floor mats were provided for comfort.

Cardiopulmonary fitness was measured using the 20 m shuttle run test (20-MST). The test began at a slow running pace (8 km/h) and ended when the subject could no longer sustain the pace. Children ran a 20 m pist, there and back continuously (one-foot touching the end-line) in accordance with a pace dictated by a sound signal. The running speed was increased every 1 min by 0.5 km/h. The subject should be required to stop if on two consecutive laps he/she failed to reach a line 3 m from the end of the pist or felt undue distress. The length of test was recorded as a lap.

In the assessment of motor fitness, the *Flamingo balance test* was used. In this test, general balance was evaluated as an ability to balance on one leg on a flat firm surface with eyes open (60 s). The clock was started as soon as the child achieved balance. If the child lost balance, he or she was unable for this test.

In the assessment of sprint test (agility), the 10*5m run test was used. Two lines 5 m apart were drawn on the gymnasium floor. On the command of "go", the pupil had to run forward as quickly as possible, pivot on the far line, and return to the starting line. This had to be repeated five times in total. The time required to complete the test was recorded to the nearest 0.1 s.

For evaluating limb movement speed of children plate tapping test was used. Two rubber discs, each 20 cm in diameter, are fixed horizontally on a table. The centre points of the discs are 80 cm apart (edges therefore 60 cm apart). A rectangular plate (10 x 20 cm) is placed between the two discs equidistant from each disc. The score is the time needed to touch each disc a total of 25 times, recorded in tenths of a second.



To measure the explosive power of the legs standing broad jump test was used. an athlete stands behind a line marked on the ground with feet slightly apart. A two feet take-off and landing is used, with swinging of the arms and bending of the knees to provide forward drive. The subject attempts to jump as far as possible, landing may be on both feet. The measurement is taken from take-off line to the nearest point of contact on the landing (back of the heels).

Data analysis: Physical fitness differences has typically been analyzed using either one-way anova test and for distinguishing the differences between areas Tukey test has been used, because the data were all normally distributed.

RESULTS

Means, standart deficiency, F values and Tukey results for different areas for physical fitness parameters of 3rd grade school boy students parameters for body mass index (BMI), hand grip (HGR), sits-up (sup), Flamingo balance test (FLB), standing broad jump (SBJ), Shuttle run test (SRT), sit ups (SUP), Sprint test (ST), skin fold total (SKFT) plate tapping (PLT) sit and reach test (SAR), for grading the students was shown on table 1.

Table 1) Means, standart deviation, F values and Tukey results for different areas for Height, Body(HG), Weight(BW), FLB, PLT, SAR, SBJ, SUP, ST, SRT, BMI, SKFT, HGR parameters of 3rd grade school boy students.

HG	N	X	Sd	F	tuke y	BW	X	Sd	F	Tuke y	FLB	X	Sd	F	tuk ey
A1	35 9	1,32	,5	6.3 6		n=35 8	30,7 9	6,6 8	0.7 7		n=35 9	10,5 2	4,7 6	3,5	
A2	23 9	1,33	,5		4-5	n=23 9	30,8 6	6,6 2			n=23 9	11,4 1	4,3 8		4
A3	13 4	1,33	,5		4-5	n=13 3	31,3 2	6,4 9			n=13 5	11,0 1	4,2 7		
A4	12 4	1,30	,5		2-3	n=12 4	30,0 2	6,6 0			n=12 3	9,78 1	4,8 1		5
A5	44 1	1,31	,5		2-3	n=44 1	31,1	6,9 8			n=44 1	11,1 2	4,3 9		
PL T						SAR					SBJ				
A1	34 9	18,4 8	3,4 9	3,9		n=35 8	1,71	5,1	1,4 3		n=35 8	119, 82	19, 2	8,5	2
A2	23 8	17,6 5	2,9 2		1	n=23 8	1,17	5,9			n=23 9	112, 52	19, 47		4
A3	13 4	18,8 1	3,0 4		2-4	n=13 5	2,41	5,4 9			n=13 5	117, 29	20, 2		
A4	12 4	18,7 6	2,7 2			n=12 4	1,43	5,6 3			n=12 4	121, 56	18, 38		5
A5	43 0	18,2 8	3,5 9			n=44 0	1,98	5,5 1			n=43 8	114, 84	17, 9		1



Table 1 Cont

SU P						ST					SRT				
A1	35 8	15,0 1	4,3	11, 4	5	n=34 7	23,7 7	1,8 8	19, 1	2-5	n=34 8	32,2 3	14, 2	8,5	3-5
A2	23 9	14,8 3	4,7		5	n=23 9	23,2 1	1,7 9		5	n=23 9	31,1 7	14, 92		5
A3	13 5	15,1 9	4,7 0		5	n=13 3	23,5 9	1,9 3		5	n=13 4	27,7 5	13, 81		4
A4	12 4	14,7 8	4,2 3		5	n=12 2	23,3 4	1,6 3		5	n=12 1	33,2 1	14, 29		5
A5	43 6	13,2 1	4,2 3			n=42 7	24,4 2	2,0 2			n=41 8	27,4 2	13, 35		
BM I						SKF T					HG R				
A1	35 8	17,5 3	2,8 9	2,0 2		n=35 9	31,5 7	17, 57	0,8		n=35 5	27,8	5,5 1	17, 9	5
A2	23 9	17,3	2,8 4			n=23 8	32,5 9	18, 19			n=23 7	27,2 3	5,1 8		3- 4-5
A3	13 3	17,5 6	2,7			n=13 1	33,7 1	17, 92			n=13 3	29,2 2	5,7 1		5
A4	12 4	17,3 9	2,8 5			n=12 3	30,2 6	16, 69			n=12 4	29,1 6	4,9 3		5
A5	44 1	17,9 1	3,1 9			n=43 5	32,7 8	18, 33			n=41 3	25,7 4	5,2 4		

Although body fat (BMI and SKFT) was found to be higher than that which is universally regarded as acceptable for boys of this age, no statistical differences was found between our urban and rural children ($p>0.05$).

Tukey tests revealed that SBJ ($p<0.05$) was significantly higher in boys living in urban settings compared to their rural counterparts and SRT was found to be significantly better ($p<0.05$) in the urban children, whereas HGR was significantly higher ($p<0.05$) in the rural subjects



Table 2) Means, standart deviation, F values and Tukey results for different areas for Height, Body(HG), Weight(BW), FLB, PLT, SAR, SBJ, SUP, ST, SRT, BMI, SKFT, HGR parameters of 4th grade school boy students

Height	n	X	Sd	F	tukey	Body W.	X	Sd	F	tukey	FIB	X	Sd	F	tukey
A1	384	1,37	,06	2,68		n=385	35,07	8,92	3,01		N=383	10,33	4,81	1,6	
A2	251	1,38	,06			n=251	34,58	8,31			N=251	10,48	4,87		
A3	122	1,38	,06			n=122	36,89	9,32		4	N=122	10,6	4,9		
A4	114	1,36	,04			n=114	33,6	5,99			N=114	9,33	4,6		
A5	454	1,37	,06			n=454	35,6	7,86			N=450	10	4,64		
PLT						SAR					SBJ				
A1	380	16,73	2,62	4,7		n=384	1,78	5,69	0,7		N=383	12,6,1	19,76	5,05	2
A2	251	16,22	2,43		3-5	n=250	1,34	6,08			N=251	11,9,2	20,94		4
A3	122	17,14	2,84			n=122	1,24	6,37			N=120	12,2,7	22,8		
A4	114	16,9	2,78			n=113	1,30	4,94			N=114	12,6,1	20,81		
A5	451	17,1	2,96			n=452	1,07	5,96			N=452	12,3,4	18,1		
SUP						ST					SRT				
A1	383	16,14	4,18	12,5	5	n=377	23,2	1,9	14,3	2-5	N=376	37,74	15,66	23,05	3-5
A2	250	16,61	4,55		5	n=249	22,66	1,66		3-5	N=246	34,46	15,43		4-5
A3	122	16,57	4,76		5	n=122	23,59	2,02		4	N=120	31,91	16,61		4
A4	114	15,96	4,19		5	n=112	22,78	1,51		5	N=111	41,39	17,5		5
A5	448	14,51	4,73			n=431	23,6	1,84			N=427	29,3	13,53		
BMI						SKFT					HGR				
A1	384	18,37	3,33	4,5		n=384	36,9	22,8	3,07		N=383	31,98	6,37	8,7	5
A2	251	17,96	3,23		3-5	n=251	37,43	22,66			N=250	31,46	6,34		
A3	122	19,03	4,07			n=120	42,3	25,1		4	N=122	32,86	6,65		5
A4	114	17,89	2,67			n=114	32,5	16,6			N=112	32,88	5,34		5
A5	454	18,8	3,19			n=436	36,8	19,4			N=420	30,13	5,72		



Table 3) Means, standart deviation, F values and Tukey results for different areas for Height, Body(HG), Weight(BW), FLB, PLT, SAR, SBJ, SUP, ST, SRT, BMI, SKFT, HGR parameters of 5th grade school boy students

Height	n	X	Sd	F	tukey	Body W.	X	Sd	F	tukey	FIB	X	Sd	F	tuk ey
A1	375	1,42	,07	3		n=374	39,4	10,4	1,44		N=373	9,63	5,03	5,6	4
A2	238	1,43	,07			n=238	39,11	9,8			N=238	9,9	4,9		4
A3	128	1,43	,06			n=128	39,6	9,7			N=128	10,05	4,7		4
A4	116	1,41	,07			n=116	37,17	9,24			N=116	7,58	4,7		5
A5	476	1,41	,06			n=476	39,38	8,9			N=473	9,7	4,8		
PLT						SAR					SBJ				
A1	370	15,66	2,5	6,5	2	n=373	1,54	5,8	0,3		N=375	135,3	20,2	10,9	2-5
A2	237	14,92	2,2		4	n=238	1,03	5,7			N=238	126,6	18,8		4
A3	127	15,3	2,37			n=128	1,3	5,9			N=128	131,7	28,5		4
A4	115	16,3	2,9			n=116	1,3	5,1			N=116	140,1	18,7		5
A5	473	15,9	3,76		2	n=475	1,5	5,7			N=471	130,9	20,1		
SUP						ST					SRT				
A1	374	17,33	4,78	11,5	5	n=371	22,7	1,69	18,2	2-5	N=371	41,29	17,27	17,1	5
A2	238	17,14	4,83		5	n=234	21,8	1,7		3-5	N=229	41,9	19,01		5
A3	128	18,32	3,6		5	n=128	22,8	2,15			N=127	38,46	16,9		5
A4	116	17,51	4,2		5	n=116	22,4	2,16		5	N=110	44,35	17,01		5
A5	473	15,83	4,2			n=470	23,1	1,8			N=464	33,67	16,25		
BMI						SKFT					HGR				
A1	375	19,25	3,95	2,1		n=375	39,44	25,6	1,9		N=372	36,8	7,2	17,05	5
A2	238	18,95	3,76			n=237	41,4	25,6			N=238	35,97	6,9		5
A3	128	18,9	3,3			n=126	40,6	24,2			N=128	37,6	6,7		5
A4	116	18,4	3,3			n=116	34,2	24,02			N=113	37,07	6,8		5
A5	476	19,43	3,4			n=473	39,9	21,3			N=445	33,5	7,1		



Conclusion

The principal aim of the current study was to examine potential differences in aspects of physical fitness in Turkish Cypriot children living in both urban and rural settings.

The main findings were that only three out of the 12 possible cases (between five different region in North Cyprus) were significantly different between urban and rural children and that these differences were not uniformly distributed in children living in either urban or rural environments.

To our knowledge, this is the first study which examined selected physical fitness components in urban and rural children using the above method to whole 3rd-5th grade school boys. Nevertheless, the present data do not agree with published reports advocating that the place of residence indeed has an impact on children's fitness. Specifically, it has been found that US urban children have superior fitness levels compare to those living in rural areas, whereas a report from Poland proposed that rural children were fitter than their urban counterparts. Methodological differences, such as the criterion used to define rural versus urban areas, variability in tests used to assess fitness levels, and statistical analyses may account for the discrepancies in the literature (Marshall, 1998; Blair; 1989; Bouchard, 1994; Ekblom, 2004; Stig, 2005).

One potentially important factor behind the lack of statistical differences in physical fitness in boys living in urban and rural environments may be the national Turkish Cypriot physical education (PE) programmes. Irrespective of schools' size or location, State Secondary School PE programmes are common and compulsory throughout North Cyprus. However, it has been recently found that these programmes are insufficient to bring about beneficial adaptations in selected health related fitness parameters, such as maximal oxygen intake. These findings are also in line with existing data from other countries questioning the validity of school PE classes and partly contradict the assertion that school PE lessons should fulfil most of the fitness needs of children. The emerging trend towards urbanisation of North Cyprus rural life may be an additional explanation for the present findings.

The lack of statistical differences between children living in urban and rural environments may be supported by the well established genetic basis of certain fitness components. It has been suggested, for instance, that aerobic fitness in children serves just as a proxy indicator of physical activity participation. However, low aerobic fitness reduces muscular fat oxidation capacity, which may decrease tolerance of dietary fat and increase adiposity. On the other hand, adequate body fat in young females is necessary for menarche to occur and this can be partly achieved through reduced physical activity levels, suggesting the existence of an energy conserving mechanism in favour of fat accumulation (Bieng-Sorenson, 1994; Kemper, 1990; Grant, 1997).

In conclusion, and within this study's limitations, including data collection from a single geographical region, it is suggested that the place of residence has no clear impact on physical fitness in 9-11 years old Turkish Cypriot school children. Further research is required involving allometric scaling to study aspects of health and fitness in paediatric populations from different countries.



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PRINCIPLES OF ISLAM IN SOLVING ENVIRONMENTAL PROBLEMS

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The aim of this article is to show the attitude of Islam to such important matters as environmental problems and environmental contamination, and to show the significance of cleanliness, described in the Qur'an and sunnah (the totality of Prophet Muhammed's sayings and deeds) of Prophet Muhammed and to stress the necessity of informing people on environmental problems as moral issues and about the ways of solving them.

Introduction

As in many branches of science, questions being considered from the point of view of physics in environmental protection must be evaluated from the moral point of view, too. In many cases, researching this matter from the moral point of view help in raising community knowledge on the question and in solving the problem as a whole. When considering environmental problems through this prism, it becomes clear that they are not new ones. Islam for a long time has emphasized these problems, ascertained public rules and laws within the framework of religious restrictions, and punished people for their non-observance of the mentioned rules and laws in accordance with the requirements of the times. Research and presentation of environmental problems to the public are of great significance from the point of view of getting the community to treat them seriously.

The aim of this article is to show the attitude of Islam to such important matters, interesting to any creature alive, as environmental problems or environmental contamination. First of all, it is necessary to note that in spite of "environmental problem or environmental contamination" lately being considered as a separate topic, questions relating to this topic although in a scattered manner, are widely covered by verses and prophetic traditions.

Although this topic is not covered in classical literature in modern form, that does not mean it is forgotten. On the contrary, Islam, having paid attention to the significance and value of each problem of interest to any individual, considered and clarified this matter, too. It is we who are to collect and systematize present scattered information on the environment.

The History Of Ecology In Islam

From the point of view of the history of Islam, the rise of the ecological trend in Islam, undoubtedly is connected with the Qur'an. When thinking about sending down the Qur'an both to recover the human soul and to save people from the darkness of ignorance, to cleanse their bodies and to put to rights their earthly affairs, the connection with the inner and material world of beings is inevitable. The Qur'an guided people, as with many other problems, in considering environmental problems. For this purpose, ecology brought up concrete questions to the faithful from the beginning of Islam.



Of course as a Prophet and Muslim leader, Muhammed was the first to get interested in environmental problems and to propagate among Muslims his aphorisms. Later caliphs, ruling after his death, from Abubekr and Omar and other celebrities, were interested in this problem and continued sunnah following the Prophet. In later periods, even though these problems were to some extent forgotten or were only partially followed by some groups due to some historical processes, they nevertheless reached the present day. In spite of everything, at all times, the Muslims treated the environment as a problem .

I. CLEANLINESS IN ISLAM

Not only material, but moral and psychological-social causes also harm the environment and contaminate it. One could say the main causes of material problems in the environment are of a psychological character, in other words, ethical and moral factors. As a result, the main and important reason behind not finding ways of solving problems constituting danger to beings and cultures and continual increase of environmental contamination is using mostly a materialistic approach to this problem. But assenting to invisible, psychological-social effect “dark forces, ignorance and sins having nothing in common with and ascribed to religious traditions,” and other moral evil spirits, make it impossible to find the ways of solving the problems.

For example, when getting acquainted with the Qur'an, one can see two kinds of cleanliness being described in this Book. One is material and physical, another is moral. Let's consider them.

A. Material Cleanliness

Taking physical cleanliness of Islam as a necessary condition for some traditional ceremonies and even as a key to prayers is an open recognition of the importance and significance of material cleanliness. In other words the key of a prayer, support of the religion, is material cleanliness, i.e, body cleanliness.

“Taharat” (ablution, cleaning), meaning physical cleanliness, consists of two aspects: najasat and taharat of hadas. Material dirtiness we call “najasat”. In the meaning, Taharat of najasat is cleaning of dirtiness on clothes, and substances being considered under Islamic law as dirty are called najis. For example, sperm, urine or clothes stained with them are considered to be “najis”. To clean clothes is called Taharat.

a. Ablution (Ghusl)

Hadas is a dirty state from the point of view of religion when carrying out different traditional ceremonies. Hadas means lack of ablution (a special ritual ablution of some definite parts of the body), a state of junub (filthy) (a state requiring a special ritual bathing- gusl), periods and post-natal period. Therefore, Taharat of Hadas means cleaning through ghusl or ablution. The Qur'an orders us to carry out ablution (Surah Maidah, verses 5/6); attention is paid to the material cleanness and the role of water in it. As is well known, ritual prayer is the state of a believer in the face of Allah. It requires both moral and physical training. Ablution is first condition of this training . According to the Prophet's order, ghusl is to be carried out after junub, periods and post-natal period; also, a Muslim is to bath not less than once a week .



b. Cleanliness of hands

The cleanliness of hands is part of overall cleanliness. It is important from the point of view of human health. Our hands are parts of our organism, being in contact with the environment most of all are contaminated. Various microbes around us infect eyes, mouth and etc. through our hands. Hands play a special role in transferring microbes. There are interesting statements on this matter: “Anyone, after waking up, should not touch crockery till washes hands three times, as the one does not know where his/her hands spent the night” . Intestinal worms, being a cause of different diseases, lay eggs in the anus of a sleeping person, and the person when scratching this part of the body in his sleep, gets the eggs on the hands and under the nails. If after waking up, one doesn't wash his hands, the eggs will penetrate his or other person's organism through the intestinal tract. To prevent it, it is necessary to cut one's nails. It is not accidental that it is ordered: “10 things from prophets and from the nature (fitrah). One of them is to cut nails” .

The Prophet ordered people to wash hands after waking up, before and after dinner, and before going to bed, and those whose hands smell of meat or fat. In addition, the Prophet ordered people to use their left hand when being in the lavatory, and their right hand when eating. By using their left hand when in the lavatory, and their right hand when eating, it is possible to prevent diseases transmitted during defecating and through perspiration .

c. Cleanliness of nose and mouth

The Prophet paid special attention to the cleanliness of nose and mouth. As a result, the order to clean one's nose and mouth every time during ablution, shows the importance of cleaning his/her nose and mouth at least 5 times a day.

Also, the Prophet used “miswaq” (a toothbrush made of fibrous sprigs), and by saying: “If I knew, that it is not difficult for my subjects, I would order to use a miswaq at every ablution” , he stressed the importance of cleaning teeth.

d. Other recommendations relating to cleanliness

Islam's orders, as to beginning from the toilet culture, carrying out ablution before each ritual prayer, and sometimes ghusl, bathing at least once a week, cutting nails, hair in armpits and pubis, circumcision, using miswaq, washing hands before and after meals, also after sleep, cleaning nose and mouth, cleaning mouth after taking milk and fatty and other foods , cleanliness of hair and clothes, and other orders and recommendations relating to cleanliness, show the importance of cleanliness in Islam.

B. Moral Purity

It would be false to restrict cleanliness only to physical cleanliness. Both physical cleanliness, but most of all, “soul purity”, “purity of thoughts” and “moral purity” are important. Islam, providing balance in everything, provided balance between the matter and morality of a human being. Therefore, it is impossible to separate material purity from the moral one in Islam.

Although in many cases moral purity outweighs the material we look at both through the same prism.



Islam ordered to keep clean both spirituality and appearance. As one cannot take an outwardly clean, but filthy person, so one cannot take a dirty person with a pure, rich inner life. Heart is an important part of a man's morality. Thus, when we speak of purity, we mean, first of all, inner purity (heart's and soul's purity). Consequently, a pure man is a sinless man, and a pure community is a community governed by sinless, pure people who make account for sins. A clean environment is an environment with not only a clean material environment, but also with sound morality. Purity of thoughts, consciousness and heart are the main conditions of moral "ecology". As a result, moral "ecology" in Islam, is first of all an ecology with Allah (God) and man at its centre .

From the ecological point of view, the most horrible contamination is a thought contamination. Therefore, above all, there is a need to develop environmental morals and habituating a sense of responsibility. This responsibility will make one treat delicately not only oneself, but others as well, inanimate and generations to come as well .

II. ECOLOGY IN THE QUR'AN

No Holy Text tells a man about nature and universe as much as the Holy Qur'an. The Qur'an explains to man how the universe was created, about the structure of various creatures, about links of man with them and shows him the way.

A. Ecological Balance

One of the main problems concerning the universe, which the Holy Qur'an dwells on, is ecological balance. The Holy Qur'an often reminds man of some definite order, justice, the regularity of everything that has been created. "Surely We have created everything according to a measure" (Surah Qamar, verses 54/49), "There is not a thing but with Us are the treasures of it and We don't send it down but in a known measure" (Surah Hijr, verses 15/21).

B. Maintenance Of Ecological Balance

Allah requires man to protect nature and the universe, to maintain its ecological balance. Otherwise, He notes that a man will suffer from it himself. As we will see in the next verses, Allah, drawing our attention to the existence of ecological balance in the universe, says: "maintain it" and warns that, otherwise humankind will face troublesome situations. "And the heaven, He raised it high, and He made the balance, that you may not be inordinate in respect of the measure. And keep up the balance with equity and do not take the measure deficient" (Surah Rahman, verses 55/7-9). "Corruption has appeared in the land and the Sea, on account of what the hands of men have wrought, that He may make them taste a part of that which they have done, so that they may return" (Surah Rum, verses 30/41). There are verses in the Holy Qur'an, propagating directly or indirectly rules on environmental protection. Let us consider some examples.



a. Morality and the environment

According to Islam, the environmental problems are moral problems as well. We can see close links between generally accepted morality and the environment protection in the Qur'an. Allah does not restrict himself by only requiring man to protect the environment, but shows the ways to do it. The main points of them constitute moral principles. A deed inadmissible from the moral point of view is not acceptable to regulate the environment and the universe. By requiring fine morality at all stages of its existence, Islam created morals guided by sound principles. Good and beauty are sure to rule the world with people of fine morality. There is no anger, lies, jealousy and bribes in the world. But justice, mutual understanding and brotherhood. Therefore, if evil forces are widely spread, there will be no results from the material point of view, even in a clean environment. Let's consider some immoral deeds registered in the Qur'an.

a1. Squandering

At present, one of the reasons for environmental contamination and ecological imbalance is squandering. There is squandering both in private life and in production and consumption, in industry and technology. As if humankind competes in squandering. False needs "are being revealed", and natural resources are being artificially exploited. As a result, ecological imbalance occurs, the air and water are being contaminated. Thus, to preserve the environment, one should avoid any squandering. And humankind is to create balanced production-consumption, according to needs. In this regard the Holy Qur'an says: "Eat and drink and be not extravagant; surely He does not love the extravagant" (Surah Araf, verses 7/31). "Surely the squanderers are the fellows of the Satans and Satan is ever ungrateful to his Lord!" (Surah Isra, verses 17/27).

As seen from the above, Islam, prohibiting squandering, demanding observant, definite measures in everything, regarding man not as a slave of material well-being but as a master of the universe and its honorary representative, teaching to respect people, animals and regularities of the world represents the strongest alternative to overall degradation.

a2. Evil

"Having separated (from you), it is going to commit evil, to destroy crops and generation (Muslim society) in the land. But Allah does not love evil" (Surah Baqara, verses 2/205). As is clearly shown in the verse, those who commit evil, do not restrict themselves by misdeeds and harming only people and societies, but harm the environment as well. Therefore, Allah negatively speaks of those who committed evil. Allah draws our attention to the above mentioned negative effect on the environment the Holy Qur'an also reminds us of such immorality like impiety, evil, squandering, disobedience and separatism of some nations, that harmed themselves and the environment, for that they died and sunk into oblivion (Surah Saba, verses 34/15-16; surah Shuara, verses 26/134, 146, 148, 176).



b. Prayer and ecology

If considered in the broad sense, especially pilgrimage to Mecca, one can see, that Islam devotions have ecological meaning. It is prohibited to kill or to harm any animal in the neighborhood of Ka'ba during the pilgrimage. Some punishment is even provided for the murder. It reminds Muslims of having a tactful attitude towards the environment. And one can also see either directly or indirectly these orders in devotions of prayer and fasting.

III. ECOLOGY IN PROPHETIC TRADITION

Prophetic tradition is concrete deeds and words of the Prophet. We will try to tell you in this chapter about deeds and words of the Prophet regarding environment protection.

A. Environmental Activity Of The Prophet

We can see that in his epoch the Prophet, to protect the environment, changed it into a policy and personally contributed to it.

a. Planting forests

Our Prophet planted forests in the wasteland not far from Medina and ordered: "Who fells down a tree here is to plant another instead of it".

b. Establishing preserves

The Prophet proclaimed Medina and its vicinage, the city of Taif and its vicinage, speaking in a modern language, to be preserve or national park, as well as Mecca. He prohibited the felling of trees and shooting birds and animals .

c. Ecological town-planning

The dictate of the Prophet to establish preserves, i.e. his order to encircle cities with plants also shows his leading role in the ecological town-planning that people need so much today. Along with it, of great significance is the suggested and realized by him form of living. The Prophet suggested building one-storied houses with big rooms arranged around a big yard or a garden. The Prophet emphasized the necessity of building houses not higher than two stories. There are even statements requiring demolishing buildings having more than two stories .



B. Ecology In The Prophet's Tradition (Hadith)

The Prophet did not restrict himself to environment protection, but also gave advice and recommendations to Muslims. We would like to point to his words concerning ecology.

a. Protection of plants and trees

“If a Muslim plants a tree, and a man, animal or bird eat its fruit, the stuff they ate will be considered sadaqah (pleasing to God)” .

“Allah will reward the one who revives deserted, dry and salty place (by watering, planting trees and plowing)” .

“If you have a young plant, whatever happens, if there is time to plant it then plant it” . The Prophet himself planted 500 persimmon (date) trees .

b. Protection of animals and birds

Ibn Omar ordered: “The Prophet cursed those tormenting animals” .

Having seen an overloaded camel not able to rise to his feet the Prophet ordered: “Allah advises to spare these animals and to load them as much as they can bear” .

“For any killed without guilt sparrow Allah will demand on doomsday” .

The Prophet ordered: “Not to destroy birdhouses , not to take their eggs and baby birds ”.

These hadiths demonstrate to us that the Prophet ordered us to protect animals and birds, not to torment them, not to use them in inappropriate work, not to overload them and not to shoot animals and birds for amusement. He said these words about such an urgent problem today as animal protection.

C. Other Ecological Activity Of The Prophet

The Prophet's orders to be quarantine in order to prevent expansion of infectious diseases to exterminate mice, scorpions, crows, birds of prey and rabid dogs , to kill all but hounds and patrol dogs , not to confuse sick and animals in good health , to clean up roads from things hampering people to protect waters, earth and air, show an importance imparted by the Prophet to the environment. Also, the Prophet called upon people to decline squandering, he even prohibited squandering of using water from the river by a wayfarer when ablution before prayer.



IV. HUMAN FACTOR IN ECOLOGICAL BALANCE

Today if we want to solve environmental problems, first of all we have to admit that the midpoint of these problems is man and the close connection of such spheres of activity as production-consumption, science-techniques and industry-agriculture with man. But we should think about man with his material and moral aspects and the principle of their non-separateness. In this case, we face environmental problems as metaphysical and moral problems. And this, as we try to point out, is ecology provided and taught by Islam. Ecology according to western concepts will be tangible only when it joins such an ecology.

Every system, independently of whether it is scientific-technical or economic-political is built taking man into account. In this case, the main moral and legislative values will represent determinant factors of science, techniques, policy, economics and trade.

All educational and training systems should be regulated under the above mentioned. Otherwise, it will become clear, that all scientific and technical activities carried out for human happiness work against human beings. The present ecological crisis is an example of it .

Indeed, environmental contamination is a global problem. People with materialistic outlooks put their interests to the forefront, and instead of finding the way out, try to take advantage of the situation. For example, they advertise different bad habits, to gain profit and sometimes governments join them .

The entire world focuses its attention on environmental contamination. But if compared with the contamination of “moral environment” this problem can be easily solved. Because, if it is nature that suffers from contamination, then all mankind suffers from the “moral environment” contamination. Families fall to the ground due to the contamination of “moral environment, narcotism is being spread, illegality and the number of gutter pres increases .

The problem of environmental contamination is nothing but a reflection of the human inner world's problem is nature. Without taking into account human factors and an Outlook guiding man, it is impossible to solve matters by only corresponding all activities with results. The first step towards protection of mankind and the environment is purifying man of wishes and preventing him from contamination. Therefore, some definite part of activities connected with environmental problems should be targeted at the cleansing of the human soul and encouraging the spirit .



Conclusions

To thoroughly solve environmental problems, one should take into account the idea of “ecological morality”. Without taking this into consideration, it is impossible to speak of environmental problems. If environmental contamination in the production or consuming process is a result of somebody’s indifference and irresponsibility, then it is necessary to instil a sense of responsibility for the environment in people as a concrete moral principle. One can find the way out only then, when the idea of “ecological moral” is adopted. On the other hand, punishment should be applied to get a matter solved, and to radically solve a matter, people should be instilled with the ecological morality. It is very important, to prevent indifference and irresponsibility in the consumption process .

Religious senses have been the driving force in creating cultures and environmental protection. Over the entire history of mankind, whatever cultural Works and good deeds they might accomplish, the reason was Islam and other religions. This tender sense played the main role in all good deeds of human sons .

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IMPORTANCE OF TREE IN ISLAM

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Understanding the Qur'an has appeared to be the healing for humans, protects from them the darkness of the blasphemy, purifies their bodies and regulates the worlds affairs, it is natural that besides the moral world it has also interest in the material world of human beings. Like in all other matters the Qur'an has guided Muslims in environmental issues too. Therefore, since Islam appeared, environment has been put as a concrete matter before the people who trust Islam.

Naturally the first man directly interesting in environmental problems and propagating Muslims with his words as a prophet and leader was prophet Muhammed. Later his followers, such as Abubekr and Omar and others interested in this issue and continued prophet's related activity.

Ecology In The Qur'an

No other holy book deals with the nature, universe like the Qur'an, which is the educator of the world, wisdom and law, prayer and divine service, praying and erudition. The Qur'an lets people know how the universe was established, for what it was established and gives general information on structures of different living beings in the universe, deals with how human beings hold active intercourse with that and shows direction.

In different verses (ayat) the Qur'an draws its attention to the nearest and farthest surroundings of the human beings and wants to think about them.

Although the Qur'an does not directly use the expression "plant trees", it shows its importance for mankind. Drawing attention to trees, fruits, gardens, in some verses it deals with their significance in life, speaking about other issues, in some verses it refers to tree as a comparison means. In both cases "tree concept" takes main place among the target of verses.

Verses connected with a tree have been equally distributed in all parts of the Qur'an. Making considerable majority words vivify the "tree concept" in the thought of each person who read the Qur'an and understand it. So, understanding the importance of a tree to be alive and attractive, pious man feels a great need to plant trees.

It should be noted that the word "shajar" meaning tree is mentioned 26 times (in 26 place) in the Qur'an, the word "paradise" meaning garden of trees is given 70 times in singular and in plural 76 times (altogether 146)¹³⁹. Besides of these, other types of trees are also dealt with in the Qur'an.

¹³⁹ İbrahim Canan, *İslam'da Çevre Sağlığı*, İstanbul 1986, pp. 18-19.



Tree Is A Great Blessing

Praise of the paradise promised to pious men is: fruits and shades of the trees planted along rivers are permanent. (Rad, 13/35). As it is known that “paradise” promised to pious men by God is “garden”. Garden was called paradise because, trees were dense there and their branches went into each other.

For instance, main subject of the descriptions promised the pious men associated with “paradise” is a tree, fruit, shadow and running water. It is known how they are connected with each other.

Over 30 times the expression “Paradise on running rivers” is mentioned in the Qur’an. It shows that “Paradise” promised those who are afraid of God, is a green Paradise, always with water and branches embracing each other.

That is why green areas covered with thick forests are called “World paradise”¹⁴⁰. Tree is given as one of the great resources of the God in many verses of the Qur’an: “Be afraid of that one who gives you things (resources) that you know (value)! Gives you animals, children, gardens and springs!” (Shuara, 26/132-134).

The Holy Qur’an is not only our divine book. It is a guidebook for all our works as well. To observe the admonition of the Qur’an about garden and tree, plant trees and gardens as described in the Qur’an and handed us as a boon and greening our country is also a religious duty.

I. Ecology/Tree According To The Prophet

“Sunnah” (Prophetic Tradition) is practically works implanted and workspoke by Prophet. But “Sunnah in ecology” is Prophet’s words and works dealing with environment and its protection.

A. The Prophet’s Ecological Activity

At his time we see that Prophet’s main policy was to protect the environment and he made great contribution to that. One of his contributions was to plant trees, afforestation and protection of forests.

a. Afforestation: Afforestation of open areas by our Prophet is known. Our Prophet planted forests in the open areas near Madina and ordered: “Who cuts a tree here must plant a new one instead of that”. Consequently al-Ghaba (forest) appeared¹⁴¹.

¹⁴⁰ Hamdi Mert, *İslam’da Ağaca Verilen Önem*, Ankara, 1982, pp. 21-22.

¹⁴¹ al-Balazuri, *Futuh al-Buldan*, Beirut, 1958, I, 17.



b. Determination Of Reserve Areas: “National parks” which are used for only tourism purposes as rest places and protected from destruction by some prohibition of all countries today, first were found in “Mecca”. Mecca and its suburbs were declared forbidden by Abraham and kept to be forbidden until prophet’s time. It was forbidden to cut down trees, mow grass, hunt birds and other animals in those areas. Before, Islam Arabs strictly observed this forbiddingness¹⁴².

The Prophet declares Madina, Taif and their suburbs also reserves or national parks like in Mecca. These areas were forbidden to cut trees, hunt birds and other animals.

It is said when our Prophet returned from Khaybar visit and reached Madina he said: “Oh, My God! As Abraham declared Mecca to be forbidden I declare it for Madina. Between the two mountains there was announced to be reserve. It was forbidden for hunting, cutting trees, mowing grass and picking leaves of trees.”¹⁴³

It is said 32 km territory was declared a reserve and Madina was centre¹⁴⁴.

It is also said that there was an appeal for those who hunt and cut trees in that reserve. “If one sees somebody hunting and cutting trees in this reserve let him beat him and take his clothes and equipment”¹⁴⁵.

c. Taif Reserve: When the people from Taif sent a group of people who wanted to be Muslim, proposed some suggestions. One of those suggestions was to declare (announce) Taif area a reserve. The Prophet accepted this suggestion, adding this article to the text of agreement. The Prophet also sent his special declaration to the local Muslims: “Bismillahirrahmanirrahim: From Prophet Muhammed to pious men: “Vadge Valley (Taif Valley) neither its thorny trees nor bushes must not be destroyed. Wild animals shall not be hunted. If somebody will not keep these prohibitions he will be beaten with whip and clothes will taken. If one oversteps the limit, he will be taken to the Prophet Muhammed. This is Prophet Muhammed’s order”¹⁴⁶.

Our Prophet laid foundation of national parks, reserves and other important environment issues that are placed on the agenda today at that time. But it is pity that Muslims have not continued this important matter for many years.

d. Ecological City Building: The Prophet’s order on determination of reserve areas, so that to surround cities with green strip proves that he was the founder of ecological city building that people need today¹⁴⁷.

¹⁴² İbrahim Canan, *İslam’da Çevre Sağlığı*, pp. 47-48.

¹⁴³ Bukhari, Abu Abd Allah Muhammed b. Ismail, *Sahih al-Bukhari*, Cairo 1313, Jihad, 71; Muslim, Abu al-Husayn Muslim Ibn al-Hajjâc, *Sahihu al-Muslim*, Cairo 1955, Hajj, 458; Abu Dawud, Sulayman Ibn al-Ash’as al-Sijistani, *Sunan Abi Dawud*, Istanbul nd., Manasik, 96.

¹⁴⁴ Mehmet Bayraktar, *İslâm ve Ekoloji*, Ankara 1992, p. 52.

¹⁴⁵ Abu Dawud, Manasik, 96; Muslim, Hajj, 461.

¹⁴⁶ Muhammed Hamidullah, *Vasaiqus-Siyasiya*, Beirut, 1969, p. 240.

¹⁴⁷ İbrahim Canan, *İslam’da Çevre Sağlığı*, p. 89.



B. Ecology in Prophetic Tradition

The Prophet was not satisfied with the practical engagement on the protection of environment, he also gave Muslims relative admonitions and recommendations. Now, let's note some of his words associated with ecology.

a. Protection Of Trees And Plants (Agitation For Tree Planting): First of all, with his words The Prophet agitates Muslims to plant trees. Some of his words are followings: "Who plants tree, the God writes for him good deed at the amount that tree's harvest"¹⁴⁸.

"There are seven things that person gets reward even he/she is in grave: for science taught, for water supplied for peoples' use, for tree planted, for Mosque built, the Qur'an gifted for reading and well-bred child"¹⁴⁹.

"If a Muslim plants tree and person, wild animal or bird eat its fruits, that will be alm for that person who plants tree"¹⁵⁰.

"If someone turns the open, arid and salty area into fertile and productive land (watering, planting trees, crop and wheat) he will get God's reward for that"¹⁵¹. "If you have small tree in your hand, try to find time to plant it even in a great disaster starts"¹⁵². "If somebody plants a tree, its good deed belongs to that person until it becomes productive"¹⁵³.

"All vegetation on the earth are guarded by angel. It lasts until the harvest time. If somebody smashes that plant, he would be hated by that angel"¹⁵⁴.

"If someone cuts a cherry tree without planting another one its place, the God builds for him a house in Hell"¹⁵⁵.

Personally the Prophet planted 500 date trees¹⁵⁶.

All these show how the Prophet liked trees and plants, protected them and propagated about planting trees.

¹⁴⁸ Ahmad b. Hanbal, *Musnad*, Beirut 1985, V, 415.

¹⁴⁹ al-Munâwî, *Fayz al-Qadîr*, Beirut 1972, IV, 87.

¹⁵⁰ Bukhari, *Adab*, 27; Muslim, *Musaqat*, 10.

¹⁵¹ al-Munâwî, *Fayz al-Qadîr*, IV, 87.

¹⁵² Bukhari, *al-Adab al-Mufrad*, Cairo, 1379, p. 168; al-Munawi, *Fayz al-Qadîr*, III, 30.

¹⁵³ al-Munawi, *Fayz al-Qadîr*, V, 480.

¹⁵⁴ al-Muttaqi, *Kanz al-Ummal*, III, 905.

¹⁵⁵ Ibn al-Aziz, *Usd al-Ghâba*, Cairo, 1970, III, 276; al-Muttaqi, *Kanz al-Ummal*, III, 905.

¹⁵⁶ Ahmad b. Hanbal, *Musnad*, V, 354, 440.



b. The Main Factor Drawing Pious Men To Plant Tree: One of the main factors drawing pious men to plant tree is “divining service of a tree”. This main factor is noted in the Qur’an, some comments are given in prophetic tradition dealing with tree planting.

Although people do not realize that, the Qur’an informs about the divining service of trees and plants: “All the plants earth and people living on them revere the God. There is nothing on earth that does not pray the God, but you can not hear this revere, because you don’t understanding their languages” (Isra, 17/44).

There are many verses dealing with divine services of vegetation indirectly. But in some other verses deal with praying of trees directly, the most valuable praying. “And grasses and trees pray God” (Rahman, 55/6).

“O, man! Don’t see all the living beings on the sky and on the earth, the sun, the moon and stars, mountains, trees and animals, and also pious men praying God?” (Hacc, 22/18). Some stories narrated by the Prophet bring clearance to the praying of trees and plants and the benefit of this praying to those who plant trees.

This story tells about the pray of the tree while it is alive (wet) and the benefit of this pray to dead person’s spirits: Ibn Abbas says: “The Prophet went out of the gardens in Madina and Mecca. He heard the voices of two persons suffering in their graves: ‘They are being tortured and reason is not so big sin (guilt)’, he said and then added: ‘One of them was suffering from urination. Another one was intelligencer’. Then the Prophet ordered a branch of tree. They brought it. He cut it into two and planted on the graves. When he was asked: ‘Why did you that?’ he said: ‘While these trees remain wet their tortures will be lesser.’”¹⁵⁷

c. Each Muslim Must Plant Tree: Prophet’s activities have to be continued by his followers despite of their directions. But it must be proved that these works belong to our Prophet. Noting that the sunnah on planting 500 trees by our Prophet is not confirmed, taking into consideration other traditions, propagating to plant trees pious men have also to implement (comply with) this sunnah. Taking into account its benefit in other world this sunnah will even bring more good deeds than others¹⁵⁸.

d. Tree Care (Love) After The Prophet: According to great historian Tabari, this is one of Abubekr’s main ten orders to be strictly observed during the war by soldier and people: “Do not cut down date trees and do not burn them”. In other place: “Do not cut down any fruit tree” is said¹⁵⁹.

¹⁵⁷ Bukhari, Wudu, 55, 56; Muslim, Taharat, III; Abu Dawud, Taharat, 11; Ibn Maja, *Sunan*, Cairo 1313, Taharat, 26.

¹⁵⁸ İbrahim Canan, *İslam’da Çevre Sağlığı*, p. 41.

¹⁵⁹ Tabari, *Tarih al-Rusul wa al-Muluk*, M.Y. Goeye publication, Leiden, 1897, I, 1850.



II. Tree Care (Love) In Islam History

We see great importance given to tree during Islamic history. One of the main place among the traditions and customs is prohibition of picking up grass and flower, to plant trees in open fields. Let's give some examples to that:

A. Preserve greening

Sunbul Efendi, a builder Sunbuliyya branch of khalvatiyya sect wants to appoint his caliph. In this connection one day he gathers his adherents and says: "Who decorates the building I will appoint him a caliph to my place. Adherents collect different flowers, decorate the building well. Only one adherent, Merkez Efendi brings a dry flower and decorates one side of the building. When Sunbul Efendi looks around suddenly he sees dry flower and asks: "Why did you bring dry flower while all others brought green ones?". Efendi Merkez's answer was: "My respected lord, I did not want green flowers stop their divine service, so I brought here dry flower because it already finished that".

Sunbul Efendi congratulates Merkez Efendi and appoints him a caliph to his place. After this event it became traditions to preserve green grass and plants in Sunbuliyya¹⁶⁰.

B. Greening

It is known the planted trees and grass in the open areas and salty places, even performing this in large scale they afforested. Let's give an example: (For instance) Grand Bali Forest: Bali Efendi (1552) who belonged to Khalvaliyya sect from Osmanli, he himself planted a big forest near Sofia, at the foot of Vitosh, which was called Bali village before and Knezhova now. Bali Efendi's grave is in the forest. That forest is stil existing today and is called Grand Bali Forest¹⁶¹.

III. Ecology in Turkish culture

In order to evaluate the attitude of Turkish people to the greenery and trees it is enough to remember proverb: "To kill a man or to cut a tree or grass is the same crime". Love of animals, birds and trees was so high among Turkish people that they accepted it as a religious duty. Even they did not dare to kill any insect. If there was a tree in the place where they had to build house, they planned buildings so that to keep that tree safe¹⁶².

A. Love of tree and sayings about tree

Our ancestors have always thought about tree, protected them and punished those who cut trees as it was sin. Even they meant for watering and watching fruitless trees. Our ancestors every day hired people for watching fruitless trees to safeguard them from drying and they considered their job a good deed¹⁶³.

¹⁶⁰ Mehmet Bayraktar, *İslâm ve Ekoloji*, pp. 96-97.

¹⁶¹ Mehmet Bayraktar, *İslâm ve Ekoloji*, p. 99-100.

¹⁶² Mehmet Bayraktar, *İslâm ve Ekoloji*, p. 102.

¹⁶³ Mehmet Bayraktar, *İslâm ve Ekoloji*, p.118.



B. Planting of memorial trees

One of the old Turkish traditions concerning trees is to plant memorial trees. As it is known, before they used to plant a tree for a newly born child, for the person who died and for the person who went to army. They believed that the tree prayed for that person who planted it and for whom it was planted. They also believed that the good deed of the shade and fruits of that tree would reach to that person¹⁶⁴.

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¹⁶⁴ Mehmet Bayraktar, *İslâm ve Ekoloji*, p.118.



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THE BUBBLES OR THE BOILING POT? AN ECOSYSTEMIC APPROACH TO CULTURE, ENVIRONMENT AND QUALITY OF LIFE

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The world is increasingly shaped by powerful global forces, by the hegemonic assemblage of political, financial and technological interests and strategies, with severe impacts on culture, education, ethics, environment (natural and man-made), physical, social and mental well-being. In a context of dehumanisation, depersonalisation and reification, all kinds of hazards, injuries, violence and atrocious behaviours spread throughout the world, intensifying the present cultural, political, social and economical disarray. Definition of problems is reduced to the “bubbles in the surface of a boiling pot”, reality is fragmented by academic formats, mass-media headlines, market-place’s interests and common sense prejudices. Instead of taking current prospects for granted and “repairing” situations to make them “straight”, a multidimensional theoretical and practical ecosystemic approach is posited to develop culture, education, communication, ethics, environment, health and quality of life, considering the dynamic and complex configurations intertwining four dimensions of being-in-the-world: intimate, interactive, social and biophysical (subject’s cognitive and affective processes; groups’ mutual support and values; political, economical and cultural systems; natural and man-made environments and contexts). Diagnosis and prognosis take into account the configurations formed by the four dimensions as donors and recipients, unveiling the connections and ruptures between them, as they *induce* the events (deficits and assets); *cope* with effects (desired or undesired); and *contribute* for change. Instead of an *exploratory* forecasting (projection into the future of the trends of today); a *normative* forecasting is posited (previous definition of desirable goals and exploration of new paths to reach them). The methodology is participatory, experiential and reflexive, heuristic-hermeneutic processes in the socio-cultural learning niches unveil cultural and epistemic paradigms that orient subject-object relationships; giving people the opportunity to reflect on their own realities, engage in new experiences and find new ways to live better in a better world, in terms of knowledge, wealth, power, growth, work and freedom.

Key-words: *Quality of Life; Culture; Education; Environment; Ecosystems; Planning Models.*



1 The salary of god and the work of man, an allegory

In the beginning, God created the heavens and the earth. He trusted on the excellence of his creation and postponed payment for his endeavor, expecting that his heavenly investment would bring dividends in due time.

Since then the cosmos was continually unfolding [6]: galaxies gave birth to stars, stars built elements for planets, life flourished in many worlds: birds excelled with their beautiful songs, plants with their flowers and fruits, human beings spread throughout the Earth.

As partner of God, mankind should honour his expectations and contribute to the creation. Care, love, justice, ethics would be God's payment in recognisance for his work. Respect for life and Earth's ecosystems would be a consequence of this partnership.

The world should not be converted into a large shopping-mall or a play-ground, for self-serving, glad-handing and self-dealing. According to a market-place's metaphor, disappointment with mankind would entitle God to "withdraw his investment" in a dooms-day.

Natural and man-made environments, democracy, ethics, social responsibility and governance, human rights, equality and justice, physical, social and mental well-being are presently undermined by all sorts of hazards and injuries, violence and criminality.

Should mankind be given a "sursis" in the case of a profound change in the present ways of being-in-the-world? The future of creation, "a new earth in a new heaven", depend of the relationships between men and men and men and nature.

Deeds and beliefs, duties and rights should be the faces of the same coin; processes and products, principles and actions should be linked together, as the by-product of a new way of being-in-the-world.



Fig. 1 Development strategies tend to undermine mankind's natural and cultural environments.



2 *The bubbles or the boiling pot?*

The world is increasingly shaped by powerful global forces, by the assemblage of political, financial and technological strategies and hegemonic interests, with severe impacts on the natural and built environment (fig. 1), impairing the physical, social and mental well-being of entire populations. Destructive concepts of growth, power, wealth, work and freedom [19] prevent proactive action, intentional co-operation, responsibility and solidarity, increasing the present disarray in all realms of life, with severe impacts on values, education, citizenship and ethics.

Life should acquire a new kind of normality, not by repairing humans, but by enhancing them [17]. “Repairing” means the tentative to restate a former “normal” level of functioning, “enhancing” creates new physical, social and mental environments to live better in a better world. Responsible projects do not consist of ready-made pieces to “mend” individual or social “defects”, but should contribute to the development of new forms of being-in-the-world. Public policies should not be mere “patches” put on bad situations to make them “straight”. “Social inclusion” policies usually accommodate people to relative powerlessness rather than challenge the structured social relationships and hierarchies deeply ingrained in the political, economical and cultural machinery of the contemporary world [13].

Once “included”, producers and consumers think that they may take every advantage of their new situation, reproducing the very system responsible for their former exclusion, notwithstanding the disastrous consequences of the “inclusion processes” in the overall quality of life. Quality of life has both an ethical and cultural property [11]. Development strategies usually annihilate values that took centuries to develop, ignoring, underestimating and undermining essential aspects of the human life [28] and of the environment.

Development strategies should care for education and culture. Prescription of rights without the cultural conditions to materialise them is not a democratic procedure. It is useless giving people the “right to play a piano” if no one had an opportunity to learn how.

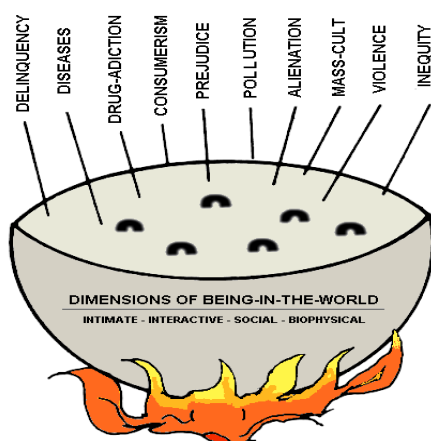


Fig. 2 Problems should be looked for deep inside the boiling pot, not in the bubbles of its surface.

Fig. 3 Microcosmic “bodies” are continuous with and permeated by the macrocosmic “environment”



Freedom *from* is not the same as freedom *for* [8]; the former merely indicates the absence of exterior constraints, but do not guarantee the capacity to make adequate choices; the latter means the capacity to understand what is at stake and develop the abilities to act accordingly. Freedom understood as the satisfaction of pleasures in a unbridled way, is opposite to *authentic freedom*, which requires an ethical ground [14] and cares for the well-being of others; we can not abuse cultural values and nature in the name of “progress” [30].

By relinquishing public duties, states normalize violent and atrocious behavior towards the society and environment; facade “democracies” prescribe “duties” and “rights”, that can not be assumed in adverse political, economical, social, cultural and educational conditions.

Definition of problems is impaired by fragmented representations of reality; segmented projects and programs try to repair “bad” situations by piercing the bubbles in the surface (consequences, taken for granted problems), ignoring what is inside the boiling pot (fig.s 2 and 3).

A process of change is not a matter of throwing out “old things”, nor acquiring “new things”, but the development of a new way for being-in-the-world; it is useless to change the furniture in a room, without a new concept for living in it: an architect has a project for a house before building it.

How are values, attitudes, habits, patterns of behaviour and strategies formed and preserved? To what degree can and may a democratic society develop “environmentally friendly behaviours” within the prevailing structures, based on the rapacity of egocentric producers and consumers? [7].

Wisdom and goodness, compliance to ethical norms, require broad, universally rationalised cultural knowledge, a multitude of ethically interpreted and ordered social experiences, a capacity for empathy with people, including those regarded as alien, or even hostile [35].

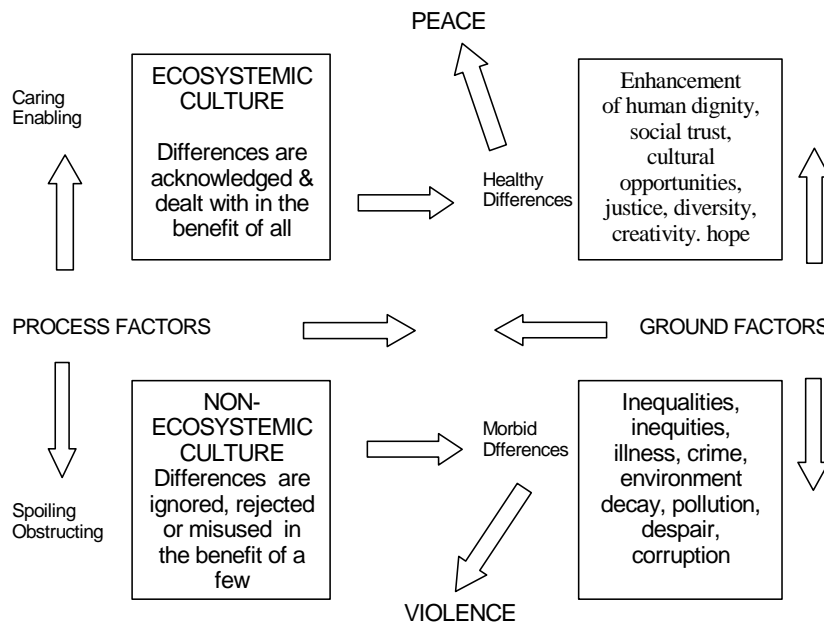


Fig. 4: Violence and peace in two models of culture.

When political, economical and cultural disarray normalises all sorts of unethical procedures and transgressions, inequities, violence and atrocious behaviour are looked by people as part of their way of life (fig. 4), deeply ingrained in the reality in which they live.

Besides economical and political equity, we must preserve the human heritage; human rights include humanistic and cultural values, the rights to enjoy natural and man-made environments, to beauty, creativity, conviviality, privacy, tranquillity and peace.

The mass media, as a public instrument through which information flows, have a responsibility towards environment sustainability, democracy, peace, culture and education, as a sophisticated way for interpreting reality and discuss our contemporary dilemmas.

A shared way of apprehending the world, the capacity to respond adequately to the experiences, encounters, engagements and interactions, depend on the alternation of challenge and support, as “strategic communication” supposes [20]:

- away from people as the objects for change... and on to people as the essential component of the change;
- away from designing, testing and delivering messages. . and on to supporting dialogue and debate;
- away from the didactic conveying of information from technical experts... and on to sensitively placing that information into the dialogue and debate;
- away from a focus on individual behaviours... and on to social norms, policies, culture and a supportive environment;
- away from persuading people to do something... and on to negotiating the best way forward in a partnership process;
- away from technical experts in ‘outside’ agencies dominating and guiding the process... and on to the people most affected by the issues of concern playing a central role.



3 *The ecosystemic approach to quality of life*

The world is not classifiable in different kinds of objects, but in different kinds of connections [5, 10]; it can be thought as a kind of a giant hologram, in which, in some implicit sense, a total order is contained in each region of space and time [29].

A mysterious tissue or matrix underlies and gives rise to both the perceiver and the perceived; selfhood, embodiment and environment, are extensions of each other, microcosmic “bodies” are continuous with and permeated by the macrocosmic “environment” [18].

Knowledge cannot be identified with the ontological reality, it serves the organization of the experiential world and should be actively built up [1]. It is not the efficient exploitation of knowledge that matters, but the learning process by which it is created and up-dated.

The conventional academic sector has surrendered to the extreme specialization and fragmentation of knowledge and adopted the model of ethical indifference, moral objectivity and neutralism.

Our public intellectuals still hung up on questions of status, power and control games and are reticent about quick and decisive action in view of environmental and cultural degradation, climate warming, pollution and looming populations [33].

The relationship between sustainable development and economic growth has been over-emphasized; social justice, solidarity and respect for the ecological limits to global development have been neglected [31]

Neoliberalism has sought to atomize society and break all bonds save contractual ones, worsening income distribution and smashing networks of solidarity, which has in some cases descended into the worst forms of violence [27].

The myth of power and the resulting conflicts (man versus environment, nations versus nations, classes versus classes, man versus God) ignores the fact that in cybernetic systems the parts can not take unilateral control over the whole or any other part [2].

Our environment presupposes our perceptions and vital processes, pre-exists and co-exists (*Wirklichkeit*), integrates our experience in the daily life (*Lebenswelt*) and is also a concept, a result of a conscious process, as "scientific knowledge" (*Realität*) [32].

Due to non-linear relationships, small inputs in systems that are far from equilibrium can trigger massive consequences, as is posited by evolutionary thermodynamics in connection with self-organising systems and sustainable development [25, 26].

Bronfenbrenner's application of ecological systems theory to human development distinguishes the microsystem, the mesosystem and the macrosystem, as complex “layers” of the environment structure, each having an effect on the human development [4].



A consistent approach to orient public policies and develop coherent programs and projects should integrate culture, education, ethics, citizenship, environment, health and peace as essential elements of quality of life [21, 22 e 24].

In this sense, instead of a “normative” forecasting (projection into the future of the trends of today), we posit a “exploratory” forecasting (previous definition of the desirable goals and exploration of new paths to reach them) [12].

	INTIMATE	INTERACTIVE	SOCIAL	BIOPHYSICAL
DIAGNOSIS OF THE EVENTS	SUBJECTS' COGNITIVE AND AFFECTIVE ACTUAL STATUS	GROUPS ' AND COMMUNITIES' DYNAMICS AND COHESION	PUBLIC POLICIES LAW ENACTMENT CITIZENSHIP PARTICIPATION	NATURAL AND MAN-MADE ENVIRONMENTS BEINGS, THINGS
ELICITING NEW EVENTS	DEVELOPMENT OF SUBJECTS' EXISTENTIAL SELF-CONTROL	DEVELOPMENT OF GROUPS AND PRO-ACTIVE COMMUNITIES	DEVELOPMENT OF PUBLIC POLICIES AND CITIZENSHIP	PROMOTION OF NATURAL AND MAN-MADE ENVIRONMENTS
IMPACT ON EACH DIMENSION	ENHANCEMENT OF SUBJECTS' WELL-BEING	ENHANCEMENT OF GROUPS AND COMMUNITIES	ENHANCEMENT OF POLICIES AND CITIZENSHIP	ENHANCEMENT OF OVERALL ENVIRONMENT

Fig. 5. Overlapping of the dimensions of the world in the genesis of events.

In this paper, a theoretical and practical ecosystemic approach based on the configurations formed by four dimensions of being-in-the-world¹⁶⁵ is presented as a framework to analyse and to deal with the contemporary problems of quality of life.

The four dimensions of being-in-the-world comprehend subject's cognitive and affective processes (*intimate*), groups' support and values (*interactive*), political, economical and cultural systems (*social*) and natural and man-made environments, beings and things (*biophysical*).

Diagnosis and prognosis of events should consider a dynamic field [15], in which all dimensions act as donors and recipients (fig. 5), as they *induce the events* (deficits and assets), *cope with effects* (desired or undesired) and *contribute for change* (expected outcomes).

¹⁶⁵ According to Binswanger's [3] phenomenological approach, being-in-the-world (*Lebenswelt*), encompasses the "inner world" (*Eigenwelt*), the "interactive world" (*Mitwelt*), the "world of men" (*Menschenwelt*) and the "environment" (*Umwelt*).



Quality of life ("good" or "bad"), depends of the configurations formed by the overlapping of the different dimensions of being-in-the-world; in this sense, macro-scale meso-scale and micro-scale projects and programs should

- define the problems within the “boiling pot” and not reduce them to the bubbles of the surface (fragmented, current, taken for granted problems);
- work with the events as dynamic configurations, intertwining four dimensions of being-in-the-world: intimate, interactive, social and biophysical;
- consider the dimensions as donors and recipients, in a mutually entangled web (configurations), developing the connections and sealing the ruptures between them;
- strengthen the singularity of (identity, proper characteristics) and solidarity between (reciprocity, mutual support) all the dimensions of the world (what affects one affects the others);
- analyze the events (education, environment, health, ethics and quality of life) in terms of the prevalent model of culture (ecosystemic or non-ecosystemic).

	Donors			
Recipients	<i>INTIMATE</i>	<i>INTERACTIVE</i>	<i>SOCIAL</i>	<i>BIOPHYSICAL</i>
<i>INTIMATE</i>	CREATIVENESS	SUPPORT	SERVICES:	VITALITY
<i>INTERACTIVE</i>	COOPERATION	COHESIVENESS	DIVERSITY:	NICHES
<i>SOCIAL</i>	CITIZENSHIP	PARTNERSHIP	ORGANISATION	SPACES
<i>BIOPHYSICAL</i>	CARE:	PRESERVATION	SUSTAINMENT	EQUILIBRIUM

Table I: Dimensions' enhancement in the ecosystemic model of culture

	Inflictors			
Victims	<i>INTIMATE</i>	<i>INTERACTIVE</i>	<i>SOCIAL</i>	<i>BIOPHYSICAL</i>
<i>INTIMATE</i>	SOLYPSISM	ABDICATION	DOMINATION	AGRESSION
<i>INTERACTIVE</i>	HETERONOMY	FANATICISM	COOPTATION	DISPERSION
<i>SOCIAL</i>	SUBJECTION	CORPORATIVISM	TOTALITARIAN	EXTINCTION
<i>BIOPHYSICAL</i>	PREDATORY	EXPLOITATION	SPOILIATION	SAVAGENESS

Table II: Dimensions' defaults in the non-ecosystemic model of culture



In the ecosystemic model of culture, we have dynamic equilibrium, interconnection, interaction, reciprocity, creativity, transdisciplinarity, intentionality, critical conscience, democratic procedures, co-operation and responsibility [tables I; V].

In the non-ecosystemic model, dimensions drift apart or seek an hegemony over each other (individuals, groups, societies and environment are in conflict); disruption, isolation, unbalances, catastrophes, disease, famine and violence follow soon [table II: VI].

Inwardness and outwardness are complementary aspects of reality; instead of a “normative” forecasting (projection into the future of the trends of today), we posit a “exploratory” forecasting (previous definition of the desirable goals and exploration of new paths to reach them) [12].

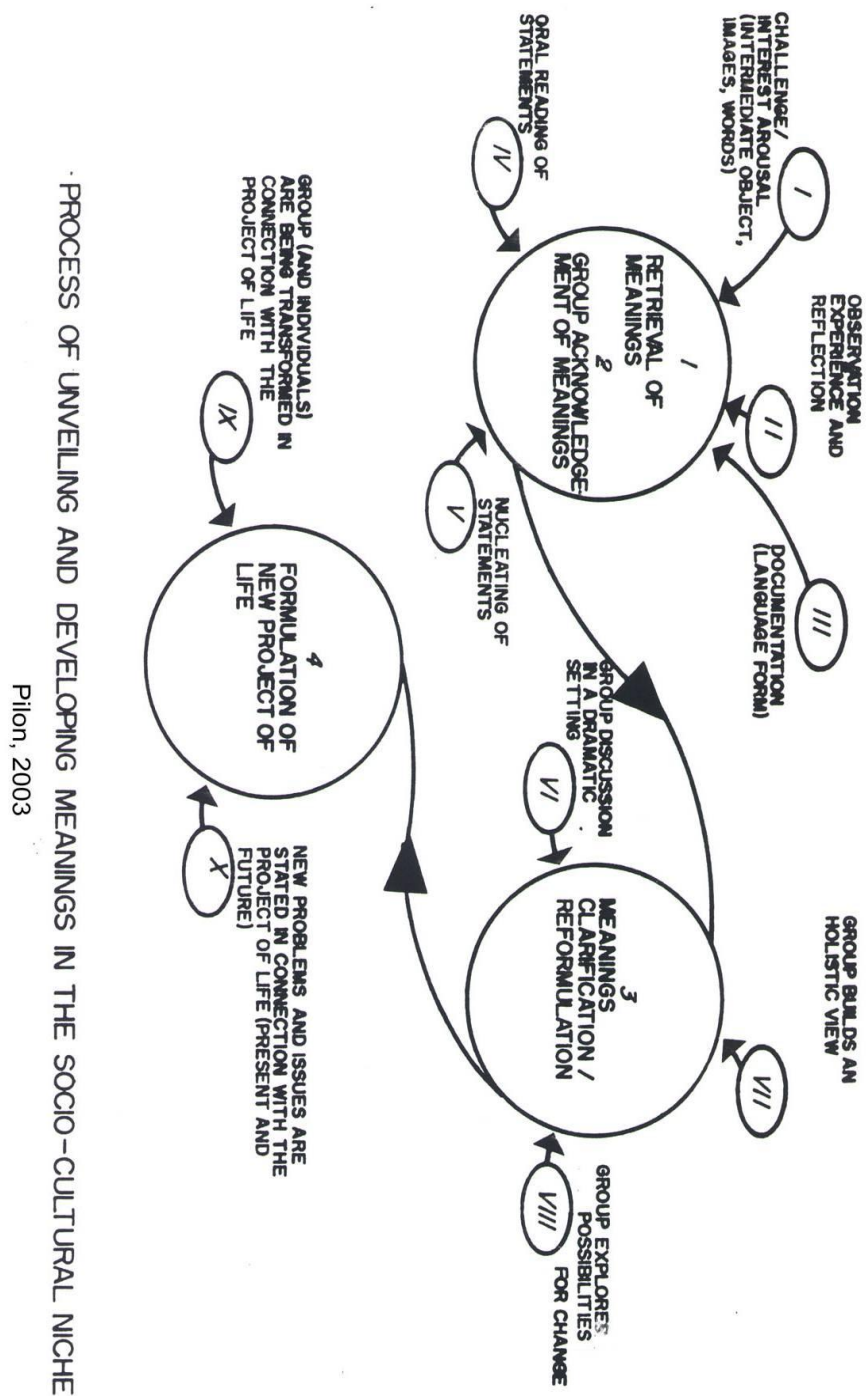
Knowledge cannot be identified with the ontological reality, it serves the organization of the experiential world and should be actively built up [1]. It is not the efficient exploitation of knowledge that matters, but the learning process by which it is created and up-dated.

4 *Capability development within the sociocultural learning niches*

Working with phenomena (how reality appears in a specific space-time horizon of understanding, feeling and action), requires an adequate learning environment, which is also essential to moral and democratic education [16].

As in a revolving door, making room for new ways for being-in-the-world entangles subjective and objective reality, demands new paradigms of knowledge and action, an “excess of meaning” [9] to create new insights, beyond the traditional schemes of thought, feeling and action.

Heuristic-hermeneutic processes [23], unveil cultural and epistemic backgrounds and subject-object relationships in a specific space-time horizon of understanding, feeling and action, dealing with both the alien that we strive to understand and the familiar that we take for granted.



Pilon, 2003

Fig. 7 How the experience is defined and dealt with is a crucial aspect of the process.



- How the experience is defined and dealt with is a crucial aspect. Each discourse rests on assumptions, judgements and contentions that provide the basic terms for analysis, debates, agreements and disagreements. The experience and the related learning process may be developed as follows:
- *Intimate dimension: working with subject-object relationships and contents.* To unveil the different forms of subject-object relationships¹⁶⁶ and the range of experiences in the four dimensions of being-in-the-world¹⁶⁷, subjects are asked to write down in a piece of paper (not identified) whatever comes to their minds in connection with images or circumstantial objects selected to catch their eyes (like bottle caps linked by a string), which are passed along the participants.

Table III Statements offered by the participants after exposure to selected objects.	
Group A	
1)	Half shell; organic/inorganic; nature/human made; solid/flexible.
2)	Found objects; shell/stones; artefacts; a collection of diverse objects not belonging to any category.
3)	Objects of nature are more beautiful and interesting in form than are manufactured articles - but the metal caps may suggest that nature provides in many ways - even when unaesthetic.
4)	Sharp and smooth texture; manipulate.
5)	Contents: world, rocks from ocean, trash caps, city from modern society, black stones, forest plant; the contents represent global communities: rural, urban, forest, islands.
6)	Three black seeds, three elastically connected bottle caps, three white river stones and a heart shaped, dried, open seed pot lay in a white rectangular open top plastic container; remains of living plants, time worn rocks and man-made metal objects represent earth materials.
7)	Different shapes, sharp objects, smooth, multi-national corporations, dry.
8)	Natural food and junk food; moderation - nature's way and mass consumption; voluntary simplicity, consumerism, sustainability, extinction/destruction.
9)	I wonder what type of music these items make; was/is the heart-shaped thing good to eat; what are the little "black beans", how were the holes drilled in the pop tops? what kind of soda are the 2 unfamiliar?
Group B	
1)	Box having within: 3 bottle caps tied up by an elastic string (it may suggest interaction, integration, inter-personal communication, horizontality); a seashell, 3 pink stones (it may suggest compartment, non integration between parts); a ribbon of paper with the inscription: how many parts have a grain? (it may suggest the type of information discussed interaction).
2)	This box (and maybe others) remembers me of my childhood and a beloved aunt, who kept photos and others belongings in it. I feel the smell of sea in the stones and in the alga. I don't know how many parts there in a seed., but nevertheless it would contain the production of life. The link between the objects means the link with other people and the basis of social relations. "Keeping" in the box means to keep people, to keep carefulness, preserving relations that became intense.
3)	The box deceived me, I expected much for so little. I thought it cold, it is not; heavy, but no. I don't like it, it is smooth, opening it I thought of a jewel-case; new sensations: white little stones, similar to those in the river where I work; united bottle caps, but for children..
4)	Curiosity, boredom, impatience, beach, sea, chilled water, patience, questions and answers, sand, anxiety, to solve, "Maria Chiquinha", children songs, China, Japan, grains, quantity, immensity, plenitude, rest, tiredness.
5)	Feeling of anguish in view of the time; inside each of us there are simple and complex things; their development will help us to grow as people.

- ¹⁶⁷ Subjects' statements can unveil different contents in the four dimensions of the world:
 - *Intimate dimension:* personality characteristics; expectations, desires;
 - *Interactive dimension:* groups' characteristics; relational issues, interpersonal encounters;
 - *Social dimension:* political, economical and social issues;
- *Biophysical dimension:* life spaces, natural and man-made environments; matter and energy.



- *Interactive dimension: sharing intimate perceptions in the group.* The written statements are subsequently distributed out of sort to the participants, who share their perceptions by reading aloud their statements in the group [table III], acknowledging the distinct subject-object relationships and the different contents registered by the participants (the experience goes beyond individual initial perceptions and is enriched in the group).
- *Social and biophysical dimensions: acting in view of the cultural and natural milieu* Prevalent and alternative forms for being-in-the-world are experienced as a by-product of present and new configurations: growth, power, wealth, freedom and work acquire new meanings. Cultural, social, political, economical and environmental issues are analysed within the different systems of culture (ecosystemic or non-ecosystemic), in view of the connections and ruptures between the different dimensions: intimate, interactive, social and biophysical.
- *Developing a new project of life:* As a result of a participatory, experiential and reflexive process, the participants have the opportunity to reflect on their own realities, engage in new experiences and develop the necessary capabilities to find new ways to analyse the problems of quality of life and act upon them.

Table IV
Overlapping of the dimensions of the world in the genesis of health problems



DIMENSIONS OF BEING-IN-THE-WORLD

	INTIMATE	INTERACTIVE	SOCIAL	BIOPHYSICAL
HEALTH PROBLEMS	<i>SUBJECTIVE WELL-BEING</i>	<i>GROUP DEVELOPMENT</i>	<i>COLLECTIVE WELL-FARE</i>	<i>ENVIRONMENTAL BALANCE</i>
<i>DEPRESSION (EXOGENOUS)</i>	PROJECT OF LIFE	GROUP SUPPORT	SOCIAL OPPORTUNITIES	ENVIRONMENTS' CONDITIONS SETTLEMENTS
<i>SEXUALLY TRANSMITTED DISEASES</i>	EXISTENTIAL CONTROL	PEERS' VALUES (FIDELITY) (DEFIDENCE)	SOCIAL MOVEMENTS PUBLIC POLICIES	PHYSICAL PROTECTION
<i>ADOLESCENT PREGNANCY</i>	EMOTIONAL MATURITY (SELF-ESTEEM)	FAMILY COHESION "FAIRE ACCUEIL"	COMMUNITY SERVICES	LIFE SPACES
<i>VIOLENCE DRUG-ADDICTION</i>	EMOTIONAL BALANCE (RESILIENCY)	LEADERSHIP SUB-CULTURES VALUES, BELIEFS	SOCIAL INSERTION CULTURAL MODELS	DWELLINGS SURROUNDINGS

5 Conclusions

This proposal is participatory, experiential and reflexive, giving people the opportunity to reflect on their own realities, engage in crucial experiences and find new ways to live better in a better world (a synopsis of the proposal is presented in table IX).

Public policies, ethics, education, culture, citizenship, health, healthy environments and quality of life are worked with as by-products of the prevailing models of culture (ecosystemic or non-ecosystemic, as summed-up in table VIII).

The objective is not to solve taken for granted problems (the apparent "bubbles" in the surface), but to unveil and work with the dynamic and complex configurations in the "boiling pot", encompassing individuals, groups, society and environment.

In order to understand health-related problems, for instance, in epidemiological terms (how they arise and how to deal with them), this approach takes into account a configuration overlapping all dimensions of the world (table IV).

Individuals, groups, society, natural and man-made environments are developed simultaneously in view of new paradigms of growth, power, wealth, work and freedom, favoring political, economic, social, cultural and educational changes.

This does not exclude that many problems may not be internally soluble within the human community, which is not self-enclosed; we have a relationship to the sky, to the gods, to the nature, to strange forces that we cannot control [34].

Innovative and socially beneficial projects, collaborative experiential learning and communicating programs, a network of hope, dignity and self-reliance, individuals who think critically, communicate effectively, value diversity and act ethically, are conditions for change.



Table V: Dimensions of being-in-the-world in the ecosystemic model of culture

Benefits from the Intimate Area

<i>To Intimate Area</i>	Creativeness: subjects receive from their inner selves the necessary conditions for creation, both in the cognitive and affective domains.
<i>To Interactive Area</i>	Cooperation: groups and networks receive from their members enabling conditions to perform collective tasks (participants help each other, offer advice, listen to others, feel others needs)
<i>To Social Area</i>	Citizenship: societies benefit from active and interested individuals, who perform their social roles with a public regard and responsibility.
<i>To Biophysical Area</i>	Care: environment receive the attention of sensitive individuals, ecosystems are respected by concerned people.

Benefits from the Interactive Area

<i>To Intimate Area</i>	Support: individuals receive support from groups and networks in order to develop their inner selves (self-esteem, identity, cognitive and affective clues to develop as mature human beings).
<i>To Interactive Area:</i>	Cohesiveness: groups and networks develop within themselves the very ground for mutual support and respect that qualifies human settlements as democratic.
<i>To Social Area</i>	Partnerships: societies benefit of networks and organised groups that sustain the social tissue, including families, peers (primary groups) and every other organised association (secondary groups).
<i>To Biophysical Area</i>	Preservation: environment benefits from the care of groups and networks, who actively preserve ecosystems (directly as specialised groups or indirectly as concerned organisations)

Benefits from the Social Area

<i>To Intimate Area</i>	Services: individuals are promoted as citizens by societies which care for education, health, employment, leisure, transport, shelter, security, etc (citizenship results from enhanced human beings).
<i>To Interactive Area</i>	Diversity: groups and networks benefit from democratic societies who permit diversity of association on cultural, political and economical grounds
<i>To Social Area</i>	Organisation: Social development and proper organisation entitle societies to provide the necessary services to promote citizens and quality of life at all levels.
<i>To Biophysical Area</i>	Sustainment: environments are sustained by societies concerned with policies and services aimed at the equilibrium of ecosystems, securing biodiversity

Benefits from the Biophysical Area

<i>To all Areas</i>	Vitality: niches sustainment, variety; biodiversity; adequate natural and man-made environments provide to individuals, groups and societies the necessary conditions to develop physical, social and mental health, enhancing the quality of life
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Table VI: Dimensions of being-in-the-world in the non-ecosystemic model of culture

Harms from the Intimate Area

<i>To Intimate Area</i>	Solipsism: self-existence is the only certainty; subject disregard others; absolute egoism hinders own development due to the lack of exchange with others
<i>To Interactive Area</i>	Heteronomy: groups lose their identity, are manipulated and attach their affairs and interests to another's law or rule.
<i>To Social Area</i>	Subjection: societies become rigid, totalitarian, obeisance to arbitrary rules is enforced by discretionary power of whimsical individuals.
<i>To Biophysical Area</i>	Predatoriness: environments are used arbitrarily, as a "primitive" source for unlimited wealth or pleasure of a few

Harms from the Interactive Area

<i>To Intimate Area</i>	Abdication: individuals abdicate of their own identities as human beings, in prejudice of original ideas, feelings and action; self is reduced and impoverished
<i>To Interactive Area</i>	Fanaticism: wild and excessive enthusiasm for ideas accepted without discussion, hinders feedback; groups cannot be creative, restricted forms of thinking degenerate into fanaticism.
<i>To Social Area</i>	Corporativism: societies are controlled by vested interests; groups lose their public dimension, ignoring society's overall interests and looking only for own immediate interests and advantages
<i>To Biophysical Area</i>	Exploitation: environments are considered as a stock of resources to be used whenever there is an advantage to the group, with no concern for others' needs and preservation of the biophysical area.

Harms from the Social Area

<i>To Intimate Area</i>	Domination: individual feelings and thoughts cannot be expressed; overall "social rule" prevails and blind obeisance is commanded for subjects; there is no possibility of dissent.
<i>To Interactive Area</i>	Cooptation: groups degenerate and are used as instruments for dominant interests; family, peers, associations, networks are coopted by vested interests to promote acts or ideas; there is no informed consent, but a strong pressure, more or less overt or subtle.
<i>To Social Area</i>	Totalitarianism: societies dwindle with the suppression of interlocutors able to present new ideas and to discuss enforced policies, issues are decided in the benefit of the dominant rulers.
<i>To Biophysical Area</i>	Spoliation: environments are abused to the point of no regeneration; deserts, drought, pollution result from brutish policies and practices in connection with production and consuming processes.



Table VI: Cont

Harms from the Biophysical Area

To All Areas

Aggression, dispersion, extinction, savageness: In the absence of the anthropic principle (inclusion of mankind as part of the natural world) environments grow increasingly hostile to humans, catastrophes could destroy entire populations

Table VII

Building quality of life in the ecosystemic model of culture

Dimensions as Donors	Dimensions as Recipients			
	Intimate Subjective Well-Being	Interactive Group Support and Integration	Social Political and Civic Life	Biophysical Healthy Environments
Intimate (personal roles) What individuals can do for the dimensions of the world	Subjects care for own development and well-being Developing cognitive, affective and cultural predicaments, coping abilities and existential control	Subjects care for significant others (own group, family, peers and other social groups) Bonding, bridging, showing solidarity, exchanging affection supporting	Subjects care for the well-fare of society Acting at different levels of local, national and global citizenship; assumptions of responsibilities on public matters	Subjects care for natural and man-made environments and forms of life Caring for environments, fauna, flora and own bodies; caring for works of art, architecture, landscapes
Interactive (group roles) What groups can do for the dimensions of the world	Groups care for individuals and support participation in different groups Developing acceptance and support	Groups care for development of own and other groups Developing reciprocity and mutual understanding	Groups develop collective organised action on society Promoting alliances, partnerships, advocacy and citizenship	Groups care for environments and bodies Participating in civil organisations promoting health and environmental goods and assets
Social (public roles) What society can do for the dimensions of the world	Society cares for individuals Securing rights to health, work, education, culture, security, justice, shelter, leisure, nutrition, sports, transportation	Society cares for groups Establishing public policies and facilities for the development of associations and solidarity within the social tissue	Society cares for society Developing social, political, economical and cultural institutions; equity, accessibility, responsibility; facilities	Society cares for environment and physical bodies Promoting healthy and pleasant natural and man-made environments; promoting physical health



Table VII Cont.

Biophysical (environmental roles)	Environment <i>benefits subjects</i>	Environment <i>benefits groups</i>	Environment <i>benefits society</i>	Environment <i>benefits environment</i>
<i>What natural and man-made milieu can do for the dimensions of the world</i>	Provision of resources and spaces for life (land, food, water, air, natural and man-made landscapes, architecture and artefacts)	Provision of resources and spaces for the organisation and settlement of groups and of group activities.	Provision of resources and spaces for collective social, cultural, economical, political and leisure activities	Balance of matter and energy, diversity and equilibrium: land, water, air, fauna, flora, architecture, landscapes

Table VIII

Summing up the consequences of two models of culture

E C O S Y S T E M I C	INTERCONNECTION, FLEXIBILITY, COMMONALITY, RESPONSIBILITY, SOLIDARITY, CRITICISM. CREATIVENESS, THOUGHTFULNESS, TRANSDISCIPLINARY	Interaction and feedback between all dimensions of being-in-the-world, promoting their singularity while sustaining the singularity of each other (dimensions are proactive, both as recipients and donors): enhancement of self esteem, proactive behaviour, cohesion and support; group growth, social diversity, cultural and educational development, environmental equilibrium, health promotion, enhancement of overall quality of life.
N O N - E C O S Y S T E M I C	DOMINATION COMPETITION, VESTED INTERESTS, MANIPULATION, COVETOUSNESS, MASS-CULTURE, COMMON-SENSE, SPECIALISATION, DISCIPLINARITY	Dwindling of intimate and interactive dimensions (loss of self and group cohesion); manipulation disruption, of feelings, thoughts and actions; perversion of social dimension by vested interests, uncritical consumerism, wealth benefit selected groups, exploitation of biophysical dimension beyond regeneration, disruption of the connections between the intimate, interactive, social and biophysical dimensions, depression, delinquency, group rigidity or disruption, political totalitarianism, disease, crime, environmental decay, widespread loss of overall quality of life



CONSEQUENCES ON THE WORLD'S DIMENSIONS

	ECOSYSTEMIC CULTURE	NON-ECOSYSTEMIC CULTURE
Intimate Dimension	Self esteem enhancement, proactive behaviour	Depression, delinquency
Interactive Dimension	Group growth, cohesion and support	Group rigidity or disruption
Social Dimension	Social diversity and cultural development	Political totalitarianism, crime
Biophysical Dimension	Environmental dynamic equilibrium	Environmental disruption

Table IX

The Ecosystemic Approach to Quality of Life, a Summing up

- **PROBLEMS:** Quality of life, natural and man-made environments, physical, social and mental well-being are currently undermined by all sorts of hazards and injuries; political, economical, social and cultural disarray normalise atrocious behaviours and violence throughout the world; in a context of dehumanisation, depersonalisation and reification. Democracy, ethics, justice, social equity, education, culture, healthy environments do not prosper, the more powerful impose their own rule over the weaker and destitute, human values that took centuries to develop are progressively annihilated while public policies, legal procedures, academic formats, mass-media headlines and market-place's interests deal with the "bubbles" of the surface (the consequences of the problems), misrepresenting or ignoring what is inside the "boiling pot" (the real problems).
- **PROPOSED APPROACH:** A theoretical and practical multidimensional ecosystemic approach and planning model is posited, intertwining, as donors and recipients, four dimensions of being-in-the-world: intimate, interactive, social and biophysical.. Events are not reduced to fragmented representations of reality, but considered as configurations, resulting from a dynamic field, expressing the connections and ruptures between the different dimensions of being-in-the-world.
- **OBJECTIVE** The objectives are the development of culture, education, environment, health and quality of life, of public policies and projects, in view of a holistic ecosystemic approach, intertwining, as donors and recipients, the four dimensions of being-in-the-world; intimate (subject's cognitive and affective processes), interactive (groups' mutual support and values), social (political, economical and cultural policies) and biophysical (biological endowment, environmental conditions, beings and things).



Table IX Cont.

- **METHODOLOGY:** Events are assessed in different contexts and settings (micro, meso and macro) considering connections and ruptures in the four dimensions of being-in-the-world, as they induce the events (deficits and assets), cope with consequences (desired or undesired) and contribute for change (diagnosis and prognosis). Heuristic-hermeneutic processes in the socio-cultural learning niches unveil the different forms of being-in-world, working with cultural and epistemic backgrounds, encompassing the intimate dimension (subject-object relationships, cognition and affect), the interactive dimension (group dynamics), the social dimension (cultural and political) and the biophysical dimension (environmental factors) in view of the development of the necessary capabilities to understand and work with new configurations conducive to a better quality of life.
- **RESULTS:** Instead of being directed to the bubbles of the surface (reduced, taken for granted problems), projects of change contemplate the dynamic configurations "inside the boiling pot" formed by the imbrication of the different dimensions of being-in-the-world, strengthening the connections and sealing the ruptures between them. Enhancing their singularity (own characteristics) and reciprocity (mutual support) as donors and recipients, development projects articulate communication, culture, education, development, communication, citizenship, environment, health and quality of life as by-products of an ecosystemic model of culture, in terms of acceptance, consistency, effectiveness, evidence and endurance, in a context of proactive and purposeful action, co-operation, flexibility, commonality, responsibility and solidarity.
- **CONCLUSIONS:** Public policies, ethics, education, culture, citizenship, health, healthy environments and quality of life are understood and developed as by-products of an ecosystemic model of culture, promoting the singularity of each dimension and the balance between them. Individuals, groups, society, natural and man-made environments are developed simultaneously and enhanced by the wholesome integration and development of the four dimensions of being-in-the-world; new paradigms of growth, power, wealth, work and freedom are associated with economic, social, political, cultural and educational changes as consequences of this ecosystemic approach.



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**INDIVIDUAL AND MIXED INFLUENCE OF HEAVY METALS
(COPPER AND CADMIUM) AND DETERGENT (LAS) ON ALGAE
*SCENEDESMUS OBLIQUUS***

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In this assessment, the individual and mixed influence of heavy metals such as Copper and Cadmium and detergent (LAS) on *Scenedesmus obliquus* has been evaluated both with lab and OECD methods by using 6 treatments and 1 blank. The concentration's limits were determined with logarithm method in Cadmium (0.01 – 0.068), Copper (1.26 – 5) and in LAS (19.6 – 74). At last, the achieved results were calculated and the correlation coefficient was determined for Cadmium (0.93), LAS (0.98), mixture of Copper and LAS (0.98), mixture of LAS and Cadmium (0.93), mixture of LAS, Cadmium and Copper (0.95) by using probit analysis. The permitted limit of pollutants is as follow: Copper (EC10 = 0.053, EC50 = 1.50 and EC90 = 4.24) and Cadmium (EC10 = 0.068, EC50 = 0.0127) and LAS (EC10 = 10.40, EC50 = 21.53 and EC90 = 130) and mixture of LAS and Cadmium (EC10 = 0.013, EC50 = 0.066 and EC90 = 0.032) and mixture of Copper and LAS (EC10 = 0.035, EC50 = 0.021 and EC90 = 1.32) and mixture of Copper, LAS and Cadmium (EC10 = 1.29, EC50 = 10.67 and EC90 = 68.3). The permitted limits of pollutants are in Cadmium and LAS mixture (0.0066), Cadmium (0.00127), Copper (0.15), LAS (2.153), Copper and LAS mixture (0.021) and Copper, LAS and Cadmium (1.067).

Comparing the achieved results shows that although there is the possibility of no harmfulness for aquatics for individual heavy metals, accompanied with LAS and detergents such toxicity reaches to high amount.

Key words: *Scenedesmus obliquus*, Cadmium, Copper and LAS.



Introduction

Considering the expansion of pollution in environment and human dependence on it provide nutrients and other necessities, it is significant to assess the various pollutants, especially, waters and other aquatics (Kordovani, 1994). Phytoplanktons are of great importance for aqua-ecosystem as they are the basis of food chain; therefore, any changing in their population structure can lead to changing in other levels of food chain. Although, some of heavy metals and detergents are of great since for algae growth, the increase of such materials individually and mixture of pollutants are harmful for algae. Copper and Cadmium are of those heavy metals (Saifullah, 1978). The entrance of pollutants in aqua-ecosystem food chain can cause pollution and disturbance or changing physico-chemically in the environment (Panigrahi and Konar, 1998). The detergents prevent from oxygen exchange in water surface layers. Such phenomenon is common especially in civil sewages discharging which cause problems in aqua-media. Natural waters receive various pollutants from various sources (Elder and Horne, 1978). Therefore, the assessment of the influence of a variety of pollutants on aquatics is more appropriate than measuring the individual toxicity of such pollutants on aquatics. This is due to the effects which are produced by pollutants mixture function. Thus on unprecedented pressure imposes on aquatic's lives (Konar and Mullick, 1993).

Materials and methods

Such tests are of short-term toxicity tests with static exposure. This means that the test organism must tolerate the effects of the chemical material which are heavy metals such as Cadmium, Copper and LAS detergent. Also, the detergent and heavy metals concentration will be steady during the testing and the tests are of selenastrum bottle test (Miller and *etal.*, 1978). The detergents and heavy metals solution was reached to one liter with using one-gram water and tested concentrations are divided into 6 treatments and witness according to logarithmic calculations and after determination of effective concentration, such solution is added into 250 ml of nutrition solution Z-8 in a complete sterile condition. All Erlenmeyer with blank in 2 to 25 centigrade and light intensity of 350- 3500 lux with 14 hour light and 10 hour darkness were kept in culture room. 96 hours later, heavy metals (Cadmium and Copper) and detergents' (LAS) effects, which were added to algae individually in the first stage and mixed in the second stage, were calculated by using turbidity method in 750 nanometer wave length and using spectrophotometer. Counting algae was done before and after adding the pollutants by using Hemacytometer lam. Finally, all the data were analyzed by using probit analysis method (Finney, 1971).

Conclusion

In this assessment, the effective concentration of Cadmium and Copper and detergents (LAS) on algae (*Seenedesmus obliquus*) was determined by some tests and concentration limitation was divided into various treatments. According to achieved results, linear equation of Digression was calculated and the figures of EC 90, EC50 and EC10 were determined for cadmium, Copper, LAS and pollutants mixture which are shown on tables and diagrams.



Kind of pollutant	Linear equation of regression	Correlation coefficient
Heavy metal Cd	$y = 5.802X + 10.148$	0.92
Heavy metal Cu	$y = 2.859X + 4.4912$	0.93
Detergent cLAS	$y = 0.416X - 0.5204$	0.98
Mixture of Cd + LAS	$y = 1.8858 + 7.2103$	0.95
Mixture of Cu + LAS	$y = 1.6333 + 6.0818$	0.90
Mixture of Cd + Cu + LAS	$y = 1.9112X + 7.4433$	0.87

Table 1: Correlation coefficient between concentration logarithm of heavy metals and detergent and probit volve on algae *Scenedesmus obliquus*.

Kind of pollutant	EC10 (mg/L)	EC50 (mg/L)	EC90 (mg/L)
Heavy metal Cd	0.068	0.127	0.237
Heavy metal Cu	0.53	1.5	4.24
Detergent cLAS	10.40	21.53	130
Mixture of Cd + LAS	0.013	0.066	0.32
Mixture of Cu + LAS	0.035	0.21	1.32
Mixture of Cd + Cu + LAS	0.011	0.052	0.24

Table 2: amounts of EC of heavy metals and detergent on algae *Seenedesmus Obliguus*

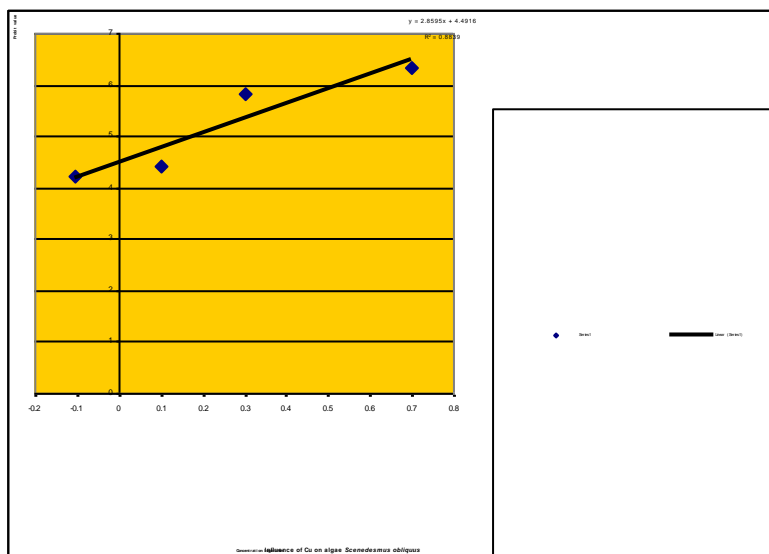
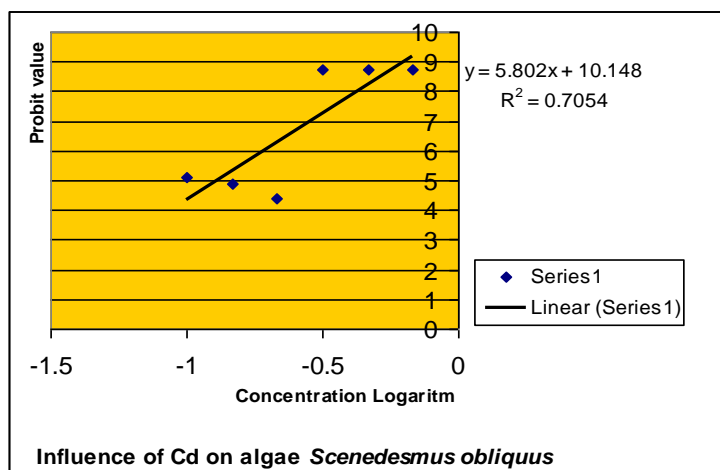
Kind of pollutant	Concentration (mg/L)	The amount of cell density changing percentage to witness in various concentration
Cd	0.1	73.9
	0.14	65.3
	0.21	37.6
	0.68	0.19
CU	0.79	80.7
	1.26	52.9
	2	18.5
	5	4.7
LAS	19.6	91.5
	38.5	52.3
	74	21.5

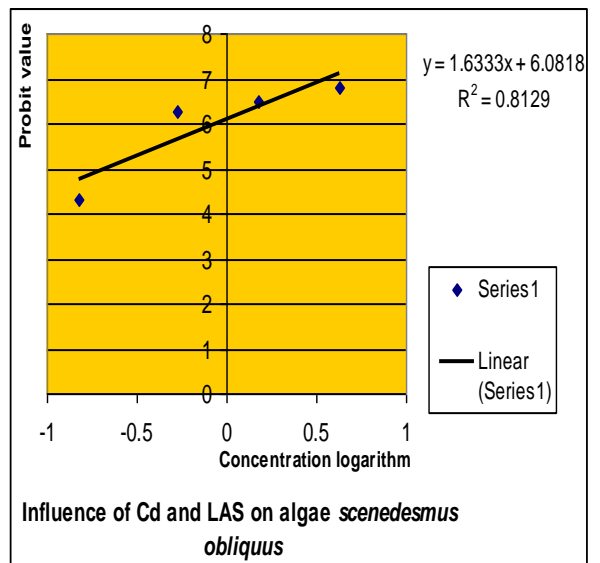
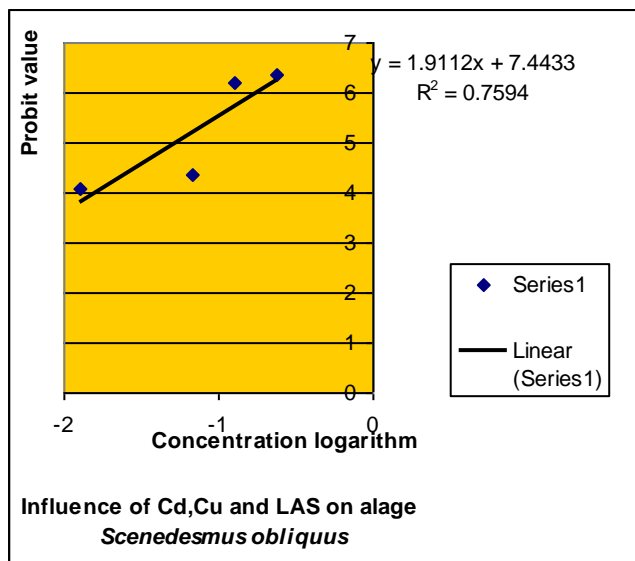
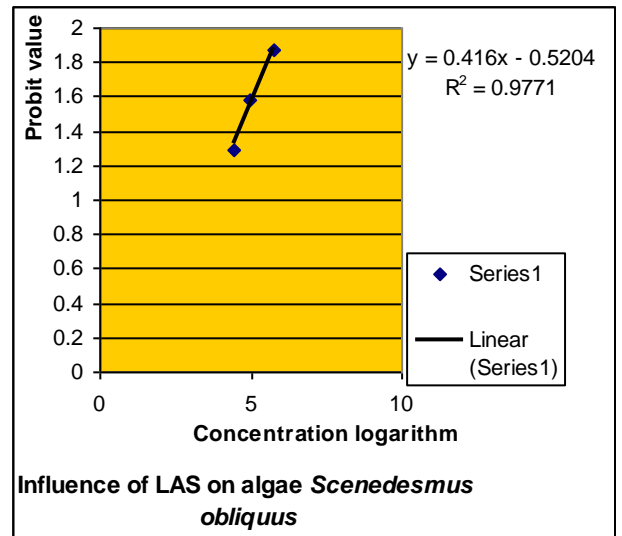
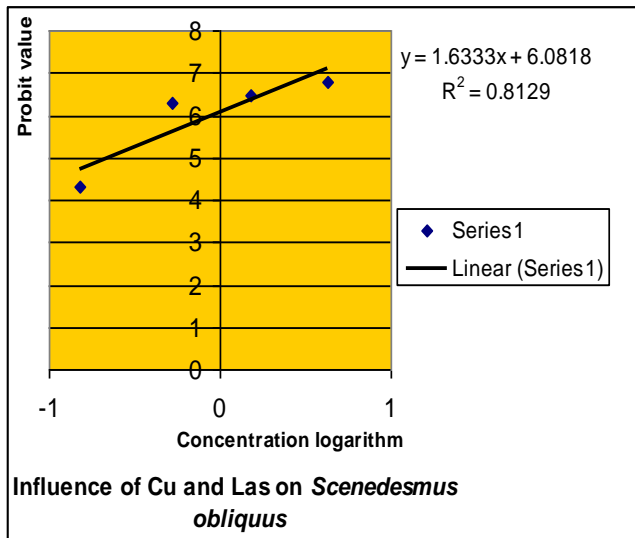


Kind of pollutant	The amount of cell density changing percentage to blank in various concentrations			
	Permitted limit	EC10	EC50	EC90
Cd and LAS	89.3	53.8	45	9.3
Cu and LAS	67.7	10.2	9.6	3.7
Cd and Cu and LAS	83.1	74.8	11.3	8.7

Table 3: The assessment of the amount of cell density changing percentage to witness in various concentrations (mg/L) of individual heavy metals (Cu and Cd) and detergent (LAS).

Table 4:
The assessment of the amount of cell density changing percentage to blank in various concentrations (mg/L) of heavy metals (Cu and Cd) and detergent (LAS).







Discussion

The results show that the toxicity of Cadmium, Copper and detergent (LAS) is very high on green algae. A concentration of heavy metals, which cause 50% of algae *Seenedesmus obliquus*, ranges from 0.127 to 1.5 mg/L and the permitted limit of such metals are 0.15 and 0.127 mg/L. Such concentration in detergent (LAS), which causes algae population decrease, is 21.53 with the permitted limit of 2.153 mg/L.

Counting the algae and assessment of heavy metals and detergent's (LAS) effects showed that after 96 hours, the concentration of cadmium ranges from 0.21 to 0.14 and 0.1 mg/L which are 37.9, 65.3 and 37.6 percent.

Increasing the concentration of Cadmium can cause the algae density decrease, therefore, in concentration of 0.68 mg/L, the density reaches to 0.19. For Copper, such concentrations of 0.79 and 1.26 mg/L are 80.7 and 53.9 percent. Increasing the Copper concentration can cause the algae density decrease, therefore, in concentrations of 2 and 5, the density reaches to 18.5 and 4.7.

In the detergent (LAS), for the concentrations of 19.6 and 38.5 mg/L, the percents are 91.5 and 52.3. Increasing the concentration of LAS can cause the decrease of the algae density; therefore, in concentration of 14 mg/L, the density reaches to 21.5.

Although some heavy metals are necessary for algae growth, when they increase, they'll be harmful for algae including Copper and Cadmium which are highly poisonous. (Saifullah, 1978) and (Kordavani, 1994) declare that Surfactant act like an obstacle against the oxygen penetration when they contact the solid-Liquid surface. (Das and Konar 1990) claim detergents, individually have a little influence on phytoplankton's population, but such toxicity will increase when detergents are with oil hydrocarbons and heavy metals. (Mullick and Konar 1991) proved that when Zinc, Copper and lead is added to *Diaptomus forbesi*, its LC₅₀ is 11 ppm, but after adding the detergent of parnolj or oil product of n- Hexane, the toxic effect of such metal will be intensified and reaches to 4 ml/L and 2.9 ml/L. Achieved results from the effect of detergent (LAS) and heavy metals' mixture on algae, *Seenedesmus*, showed that cell density percentage to witness in lower concentrations from individual pollutants' effects, will be reduced and show more toxicity of pollutants mixture. In certain tests related to mixture effect of Cadmium and LAS according to concentrations of permitted limit of EC₁₀, EC₅₀ and EC₉₀, the cell density percentage in high concentrations of EC₅₀ and EC₉₀ are 45 and 9.3 percent and in low concentrations of permitted limit of EC₁₀ are 89.3 and 53.8 percent which comparing to effect of mixture (Copper and LAS), the cell density percentage in concentrations of EC₁₀ are 76.7 and 10.2. This amount has more toxicity when compared to individual effect of Copper and LAS. The cell density percentage in high concentrations of EC₅₀ and EC₉₀ are 11.3 and 74.8 which in low concentrations of permitted limit and EC₁₀ are 83.1 and 74.8. These amounts show a significant toxicity when compared to the individual effect of pollutants.



The related tests show that although some of these heavy metals and detergents are necessary for algae, when amount of them individually or mixed with other pollutants increase, they become harmful. The effects of pollutant mixture toxicity on aquatics are more than the time when aquatics are exposed to individual heavy metals or detergents. Considering the critical position of phytoplankton as aqua-ecosystem's main producers, we attempt to equip the water sources, which are exposed to industrial and urban pollutants, with refinery systems, otherwise, aqua-media will encounter with life crisis in near future and aquatics are exposed to various threats.

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MEASURING THE RESIDENTS' PERCEPTIONS TOWARDS COMMUNITY APPROACH TO TOURISM PLANNING: THE CASE OF FAMAGUSTA IN NORTH CYPRUS

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Countries need to protect the resource base tourism and satisfy the needs and desires of tourists and of private and public stakeholders, as well as, the local host community for sustainable development of the industry. In today's conditions the economic and political aspects of North Cyprus are sensitive and changing. Thus, there is a need for new way of looking at the economic, social, cultural, environmental and political environment. However, the community approach to tourism development is necessary to be taken account of for the welfare of residents living in the existing tourist destination. Thus far, no research in this area has been completed and such research will fill a gap. This research aims to measure the residents' perceptions of the "community" approach to tourism planning developments in North Cyprus. The Famagusta area has been taken as a case which is one of the popular tourist destinations in North Cyprus. Nowadays, the city is important for the North Cyprus economy and Famagusta residents because of the commercial port, hotels, and with a large student population in the region. Thus examining the Famagusta residents' perceptions of tourism development is important due to the high potential of tourism activities in the city. Results indicate that residents of Famagusta support tourism development but believe in the necessity of community involvement in the formulation of appropriate tourism policy and development plans in tourism, in Famagusta/North Cyprus.

Key words: *Policy, planning, tourism, community involvement, sustainable tourism development, Famagusta/North Cyprus.*

INTRODUCTION

Tourism is one of the world's fastest growing industries. Like other industries, such as, agriculture, education, manufacturing, construction etc., tourism affects the economy of those areas where it takes place. Millions of people in the world are benefiting from tourism. Nevertheless, as significant activity tourism provides employment, generates income, and results in satisfaction for both parties who are benefiting from these activities. The World Tourism Organization [2002] reported that, tourism is in one of the top five export categories in 83 % of countries. It is regarded as the main source of foreign exchange earnings and covers 8 % of worldwide earnings for export commodities and services. The report also shows that, tourism contributes from 3 to 10 % to GPD (Gross Domestic Product) in advanced diversified economies and up to 40 % to GDP in small island economies and developing countries (World Tourism Organization, [2002], Web Site: <http://www.world-tourism.org>).



Murphy [1985] claimed that, “the impact of the tourism industry and its local issues will vary according to its magnitude and relative importance, but in every case politicians, businessmen and residents are recognizing that they cannot ignore tourism if they wish to benefit from it”. Therefore, countries need to protect the resource base tourism and satisfy the needs and desires of tourists and of private and public stakeholders in the tourism industry as well as the local host community for sustainable development of the industry. In addition proper development programs will be the case to be taken into account by the policy and planning makers.

In order to conserve the environment, maintain the quality of the visitor experience, and provide benefits for local communities by ensuring that tourism planning is undertaken as part of overall development plans, for the short, medium, and long-term should encompass these objectives. For instance, incorporate tourism planning with planning for all sectors and development objectives to ensure that the needs of all areas are addressed. Thus as it is stated by UNEP [2003], tourism planning should not be undertaken in isolation (Web Site: <http://www.unepie.org>). Marín [2000] in his study mentioned that, “a traditional temptation when regulating the tourist industry and its environmental effects consists of resorting to regional planning instruments as the only framework for consensus”.

However, the community approach to tourism development is necessary to be taken account of for the welfare of residents living in the existing tourist destination. In addition to the mentioned statements by different researchers; in order to promote an orderly development, tourism needs to lead an increase in social, economic, political and environmental benefits to the host communities. Therefore, community involvement in the planning and policy development processes is necessary, as local residents are regarded as the owners of the tourism product in a tourist destination.

North Cyprus as a small island state is directly and mainly affected by its invisible goods' sector. Tourism policies are considered to be an important contributor to the development and protection of the country's resources. Moreover, tourism is regarded as the locomotive sector in the country. As tourism is the backbone of the service sector, it provides income in positive ways to the island's economy. For the countries where income depends on tourism activities, tourist destinations, especially Small Island States, need a clear vision regarding the tourism sector. North Cyprus had been faced with many significant problems until it became a Republic, and had been governed as a Federation before 1983. The economic life of the island had many fluctuations because of the unstable political conditions. The economy of Cyprus is in two parts, namely South and North. Compared with South Cyprus, North Cyprus has much difficulty in arranging foreign trade, finance and investment, as it is recognized only by Turkey. Thus foreign firms usually hesitate to invest in North Cyprus in the same way as they do invest in South Cyprus. In today's conditions the economic and political aspects of North Cyprus are sensitive and changing. Thus, there is a need for new way of looking at the economic, social, cultural, environmental and political environment. Moreover, new developments started to take place on the island at the same time. These new developments made the tourism authorities rethink and renovate North Cyprus's tourism policies and planning. Dependent on this, new investments on both a national and international level will also start to take place regarding the possible political solution on the island.



The positive economic impacts and changes resulting from the new developments, the negative impacts on water and environmental pollution, and socio-cultural impacts affect the healthy development of the sector. North Cyprus has an unspoiled beauty. The environment, as one of the most important factors in the tourist product, has to be conserved. Thus, the need for new policies and planning strategies becomes significant for having sustainable and proper development on the island. Tourism plans at the local level, however, are much more concerned with the needs of those living and running businesses in tourist destinations, and the impact which tourism has on them and the fabric of the destination itself (Davison and Maitland, [1997, p.9]). However, the community approach to tourism development is necessary to be taken account of for the welfare of residents living in the existing tourist destination.

There is a need for appropriate policy and planning of tourism in North Cyprus. Thus far, no research in this area has been completed and such research will fill a gap. This research aims to measure the residents' perceptions of the "community" approach to tourism planning developments in North Cyprus. The Famagusta area has been taken as a case which is one of the popular tourist destinations in North Cyprus. Nowadays, the city is important for the North Cyprus economy and Famagusta residents because of the commercial port, hotels, and with a large student population in the region. Thus examining the Famagusta residents' perceptions of tourism development is important due to the high potential of tourism activities in the city.

REVIEW OF THE LITERATURE

In recent years, the dynamic changes in world conditions and the global competitive environment have led many industries to develop towards getting a competitive advantage. This is due to the need for surviving within the competitive environment. Thus, as one of the fastest growing industries tourism also has become global and has led to many dynamic changes in order to compete within the highly competitive world market. Handszuh [2001] mentioned that, "tourism is a barrier-free industry for trade which affects to the development of all other sectors". Therefore, policy and planning development need to be taken into consideration in order to sustain the tourism industry within the country where it takes place. The development of the tourism industry has led many countries in the world to work towards minimizing the possible negative impacts and maximizing the positive impacts for the healthy development of the destinations.

Mathieson and Wall [1992, p.34] claimed that, "impacts of tourism are dynamic, changing with corresponding changes in destinations features, trip characteristics, and the personal and behavioral attributes of tourists". Thus, tourism's contributions to socio-cultural, economical, and environmental costs are unforeseeable. Furthermore, the costs that arise from tourism development affect mainly the host communities as well as a country's development and the sustainability of its social values and its environment. Hosts-tourists interactions, newly developed tourism activities, wide range of investments, decrease in useable land resources, and deterioration of environment as well as quality of living standards etc., are all negative impacts because of the development of tourism. As the small island developing states have different characteristics focusing on sustainability for those states in all sectors including tourism becomes crucial.



Therefore, sustainability for not only environmental reasons but for the healthy development of the whole island's tourism industry is significant due to the increased attention given to sustainable tourism development in order to minimize the impacts of tourism development is necessary.

Moreover, islands with their different characteristics and high biodiversity feature are faced with unique problems. Guillet [2003] states that, "island attracts considerable international support for the conservation of their environment, but very little support for the development of their human inhabitants". Thus, this can result in conflict between the interest of the residents and conservation activities of the islands. Tourism growth has a significant impact on a country's environmental policies where crucial attention should be said to environmental quality and as a result the need for sustainable development became a growing concept to be taken into account by the policy-makers in small island developing states.

Fennell and Butler [2003] suggested that, in the context of sustainable development, environmental constraints play a major role in determining appropriate types and limits to development. In other words, the environmental impacts of tourism in terms of air, noise, and water pollution lead to a review of the development of tourism within the destination where it takes place. Despite these, Buhalis and Fletcher [1995, p.3] pointed out that, tourism has been responsible for a great number of environmental problems. The major problems arise because the environment (at least short term) is a zero-priced public good, and as with any zero-priced good, is subject to excess demand and over-utilization.

Policy-Planning Developments in Tourism Industry

"Planning is a continuous process; policies have to be evaluated according to exogenous changes and additional information. That is particularly true for tourism, and industry sensitive to changes in politics, economy or fashion. The preparation of a monitoring system allowing periodic or permanent revision of the development plan is one of its essential provisions" (Pearce, [2000]).

Nowadays, a large number of cities have become tourist destinations. They attract tourists with their rich, unique and culturally diverse townscapes, as well as their settings in natural landscapes [Julta, 2000]. Riley [1995] argues that, if slow growth is a necessity, then the consequence is a delay in establishing the destination in the world market. In this manner, characteristics of small islands should be taken into account while developing a tourism destination. Every island destination therefore has its own character and general principles of management and good practice need to be shaped accordingly, based on a through understanding of tourism in the context of wider development issues. Henderson [2000] reveals that, the small size of the islands creates both problems and advantages in managing it as a tourist destination. The author also agrees that, increasing arrivals and facilities for islands will pose a threat to the ecology of the islands, however, and there is a need for a planning framework. According to Julta [2000], the unique urban landscape is a result of the weaving together of topography, architecture, the arrangement of streets, urban spaces and vistas. He agrees that, the visual image of a city is a powerful one through which the city is known to people. It provides a visual identity for the city and creates an everlasting memorable experience for tourists and a sense of civic pride for residents [Julta, 2000]. These statements show that to succeed in competitive world conditions, planning should be applied to the tourism sector.



As a result countries are able to increase the attractiveness to the tourist, increase the welfare of their community, and create a good image for the destination. In addition to these, the importance of policy-planning frameworks in the tourist destinations becomes an important subject to be taken into account by the tourism authorities whether public or private.

Tourism Policy

“The world is becoming a global village in which people from different continents are made to feel like next door neighbors. In facilitating more authentic social relationships between individuals, tourism can help overcome many real prejudices, and foster new bonds of fraternity. In this sense tourism has become a real force for world peace” (Pope John Paul II, cited in Edgell, [1999, p.1]). The new developments in the world have led to changes in the regulations and policies of countries. In this manner, economic, environmental, social, and political policies have been faced with global threats and challenges. For instance, environmental conservation has been shown to be one of the most significant issues, due to its effects on the communities’ welfare, quality life standards and protection of the environment for future generations. Moreover, developments processes impact not only the environment, but if not taken under control then it would lead towards collapse of the whole system in the country. Murphy [1985, p.160] stressed that, “new conditions in either the generating or competing areas, plus changes in accessibility, can alter the flow and pattern of visitors arrivals, changes in a country’s priorities and objectives can alter exchange rates or reduce public funding. All of these can have a strong influence on planning policies”.

The relevant literature reveals that tourism policy issues play an integrating role for the economic, cultural, social, political, business, and environmental benefits of tourism cohesively with local people, destinations, and countries in order to improve the quality of lives and provide welfare. Hall and Jenkins [1995, p.1] advocated that, public policy must be the focal point of the business environment. However, policies should be adopted and legislated in a way that they will contribute welfare for the community as well as the industries operated in the business environment. Furthermore, public authorities should accept the importance of the tourism industry as a vehicle for the promotion of their country. Instead of regarding the importance of the industry as an economic source for their income they should also consider its’ impacts on socio-political contributions and community welfare in terms of an increase in living standards, and employment opportunities and seeing the importance of planning and policy development for their countries. However, planning authorities and the other agencies involved in development of the tourism destination should adopt more positive and proactive approaches to provide development opportunities in those areas.

In essence, the principle purpose of public sector policies will be to coordinate the economic activities occurring within a given territory so that their demands for environmental services are met within the limits of local environmental carrying capacity (Briassoulis, [1995, p.33]). Concentrating on how the land use component of the needs for social, economic development, environmental protection and conservation in the planning processes for both hosts and tourists would lead to a more effective delivery of policies and services for the effective and efficient development of the destination. As a result of these, it is obvious that, policies for tourism development due to the need for mutual benefits for both parties are necessary to be taken into account. By this way, long term sustainable tourism development can be reached on both a regional and national basis.



Tourism Planning

Tourism is a complex process comprising many parts and interconnections, involving not only the visitor and his/her movements but also the destination and the host community. Getz [1987], defined tourism planning as “a process, based on research and evaluation, which seeks to optimize the potential contribution of tourism to human welfare and environmental quality” (cited in Davidson and Maitland [1997, p.6]).

Managing tourism destinations is an important part of controlling the development and it is crucial in creating an image and influencing the expectations of tourists. According to Davidson and Maitland [1997, p.95], one reason tourism needs to be managed then, is that market response to increasing demands for tourism activities often leads to unacceptable adverse impacts: to the environment, to the local economy or to the host population. Fennel and Butler [2003] in their study recommended that, “success and failure in tourism industry need not be measured on the basis of economics solely, but alongside longevity, harmony and sustainability”. The authors also conveyed that, an appropriate way to develop an appreciation of the impacts of the tourism industry is through a better definition of the relationships that exist between three key elements: tourism groups, the resource base and local interest. The lack of coordination and failure to investigate competitive opportunities are reducing the effectiveness of destination planning. Therefore reducing the failures to investigate competitive opportunities is possible with the right marketing and planning strategies for the tourist destination. For tourism activity at any destination to be considered a success for all concerned, it must not only provide a satisfactory experience for visitors, but also maintain and improve the quality of life of residents and protect the local natural, built and cultural environment (Davison and Maitland, [1997, p.2]).

Dwyer and Forsyth [1997] on the other side conveyed that, the tourism yield is where it brings net benefits to a host country from international visitors and in which that is the benefits minus the costs of the tourism activity. Another study by Eccles and Costa [1996] reveals that, “The developing countries of the world are renowned for implementing tourism as a means of supplementing economic output. If tourism is to be considered as a source of regional development, planning of local resources and infrastructure is required. In essence, developing countries need to consider this issue, incorporating sustainability as a means of ensuring long-term success. Sustainability can be seen as a fundamental requirement for countries attempting to develop their tourism industry. In the process of developing a tourism product, planners must ensure harmony with the local environment.” This is true for small islands tourism development as well.

In general, the main problems facing small islands regarding sustainable development could be the increasing stress from pollution, development, climate change and natural disasters. In the light of their limited resources, small islands try to restructure their economies and increase their market share in the global world. They should take into consideration the importance of the environment where both public and private bodies, as well as the local people, have to be educated in that manner.



Kakazu [1994] states some of the characteristics of the small island developing countries as “economic activities are less diversified and more specialized in small island economies, due mainly to their narrow range of human and nonhuman economic resources. Because of the small domestic market, there are not many options available for economic development. Thus, under the constant population pressure on the limited arable land and the “revolution of rising expectations”, almost all small island states have had to open their economies’ dependency on external factors, which creates the problem of economic instability and vulnerability, which has been a challenging subject”. According to the author, small island states are heavily dependent on government activities as a major source of income and employment (Kakazu, [1994, p. 4-7]).

Furthermore, small island nations, are generally faced with local environmental factors, such as pollution, population pressure, and natural resource management and they must implement new planning policies, like measuring carrying capacity, land use and legislations and regulations, also they must implement new plans to improve their sustainable tourism development. As tourism brings economical benefits to a nation its impact on environmental and social issues must be taken into account. The conservational and environmental impact of tourism, which includes sustainability, has a great effect on the development of tourism especially in small islands. Despite these, tourism contributes to the social life and social integration of the islands in many ways. It is one of the major human economic activities; emphasis should be placed on the concept of sustainable tourism.

Public and Private Sector Involvement in Tourism Policy-Planning

Successful tourism development does not simply occur on its own, but one of the factors helping to determine the success of tourism in a region is the level of involvement, whether public or private, in the industry. As the flow of tourists increases in a nation investment in industry also increase in order to attract new tourists. In order to do so, strategies and actions should take into account the wishes of all stakeholders, namely local residents groups, regional, local and national government, NGOs, businesses and investors, tourists, tour operators and intermediaries, accommodation establishments, and NTOs. Furthermore, co-ordination of all tourism related parties is the key for successful planning and policy developments. According to Godfrey and Clarke [2000], the range of names used to describe tourism groups (e.g. tourism board, association, committee, advisory group or visitor), serves well to highlight the broad diversity of approach applied to the industry in many different locations. Thus the ability of the tourism organization to manage tourism development in the destination by given range and diversity is important for their involvement in decision-making. Tourism development needs to be the work of all community interests. Involving all sectors of the destination in planning tourism development is crucial for the mutual benefit of all parties. From another point of view, once tourism is shown to be successful, private developers or governmental agencies are often willing to invest even further in the area. In this manner, public and private sector initiatives are crucial for the sustainable development of the tourism industry.



Murphy [1985, p.159] stated that, planning in tourism has undergone considerable refinement and adjustment in response to the changing scale and complexity of the industry- in much the same way as government involvement changed in form. Government involvement in many small island states is high due to their narrow resources. Government and politics are typically pervasive in small island states: everyone tends to depend on government for something (Lemon, [1993, p.44]). For instance, in many countries, tourism promotion and marketing is regarded as the role of government. Therefore, government plays a facilitator role in managing tourism in those countries.

Three sectors of tourism developers determined by Gunn [1994], governments, nonprofit organizations (namely NGOs), and commercial enterprises, as the tourism developers. These parties make decisions on development for their own specific role in tourism. Westlake's approach to interaction of these parties in tourism planning development is that, "tourism as an activity, being based on interactions of particular destinations and so requires coordination and the cooperation of the various providers public and private, small and large" [1995, p.85]. Thus, involve all primary stakeholders in the development and implementation of tourism plans, in order to enhance their success -projects are most successful where all main stakeholders are involved- is crucial for achieving their goals. UNEP (2003) explains this as, encourage development of partnerships with primary stakeholders to give them ownership shares in projects and a shared responsibility for success.

In addition to these, while determining planning activities which raise issues of pollution, planning authorities have a statutory requirement to consult a number of bodies as mentioned before including public authorities, the local Chamber of Commerce, Nonprofit Organizations (NGOs), tour operators, intermediaries, accommodation establishments, residents, and tourists. In conclusion, if there is equal involvement from each party to the tourism development planning and policy processes success and effectiveness will be reached in easiest way.

Community Involvement in Tourism Policy-Planning

"The people who must leave with the planning decisions should be involved in their formulation, particularly since many action programs resulting from personality planning are not community or public sector efforts; they must be implemented through the initiative of individual landowners or citizens" (Rosenow and Publisher, [1979], cited in Murphy, [1997, p.165]). Local people have a right to be consulted about changes taking place, so that community participation should be recognized as a key element in sustainable tourism [Henderson, 2000]. Local community in a destination must be able to use their knowledge for the benefit of successful environmental planning and the decision-making process. Dinan and Sergeant [2000] suggested that, a sustainable approach to tourism involves a co-ordinated attempt to manage the tourism environment in such a way that the long-term integrity of a region's natural and human resources will be preserved. Mathieson and Wall [1992] wrote that, the primary aim of the sustainable tourism approach is to negate some of the impacts traditionally caused by unplanned tourism, through the development of a carefully integrated plan involving tourism managers, product providers and host communities (cited by Dinan and Sergeant, [2000]).



Moscardo and Pearce [2003, p.258] observed that, “when the goals and characteristics of the sustainable tourism are built on such phrases as: to improve the material and non-material well-being of communities; to ensure the cultural integrity and social cohesion of communities; and tourism which has social equity and community involvement the further challenge is to ask by whose definition, from whose perspective is the community improving its well-being, its social and cultural integrity and its equity”. Murphy in his book stated that, where development and planning does not fit with local aspirations and capacities, resistance and hostility can raise the cost of business or destroy the industry’s potential altogether. He agrees that, tourism needs to be planned and managed as a renewable resource, industry, based on local capacity and community decision-making (Murphy, [1985, p.153]).

Generally speaking, tourism development has an impact on the local residents of the destination. Thus reducing the negative impacts and increasing the positive impacts of tourism development is crucial not only for the country as a whole but especially for the community as well. There is a growing need in terms of increasing planning in a more integrated manner on both a regional and local scale. In this manner involving the community in the tourism planning and policy processes is an important issue to be taken into account. García-Falcón and Medina-Muñoz, [1999] advocate that, community participation is crucial to the formulation and implementation steps of any strategic planning with a sustainable development approach. Specifically, residents, tourists and private and public tourist organizations should be involved in the strategic planning process. According to the authors, at each step of the planning process, planning authorities (normally the government), private industry and the local community must accept that tourism is a desirable development option.

Westlake [1995, p.85] stated that, “the history of planning during the twentieth century has seen a move, both towards and away from specific foci and approaches often not relevant to tourism such as: ideas of comprehensive and socially responsive planning for the community are approaches which at times have been in fashion with planners. Achieving such goals for the community are often seen as politically driven and hence their non acceptance by some.” Godfrey and Clarke [2000, p. 53] viewed this as the third core element of the successful co-ordination and leadership of tourism development activity. The authors’ approach to the importance of community involvement in tourism planning is that, “community involvement in the strategy and management process is a central aspect of minimizing tourism impacts as they affect the resident population. Such involvement also provides the opportunity for constructive criticism of issues directly affecting destination residents; it can help to diffuse local tensions that might otherwise develop into major problems for tourism growth; and it can help achieve more broad-based political support when actions are shown to have considered local concerns and taken an appropriate response”.



Scheyvens [2003] in her article discussed the importance of community involvement in tourism planning and policy developments as, “full participation can be said to occur where communities supply the majority of goods and services to tourists, have considerable input into planning decisions, and they collectively manage common resources”. She also stressed the need for community empowerment in four dimensions for tourism planning and policy developments. Economic empowerment and social empowerment (where *economic* gains from involvement is the spread of the benefits, thus, the community’s sense of cohesion and integrity which would be confirmed as *social* empowerment will be created); psychological empowerment (a community’s confidence in its ability to participate equitably in tourism planning, development and management is maximized, and community members can play an active role in decision-making); and political empowerment (community members’ voices and concerns should guide the development of any tourism initiative from the feasibility stage through to its implementation) (Scheyvens, [2003, pp.234-36]).

The relevant literature reveals that communities change over time in how they perceive tourists as well as how they react to tourism developments. As a result, involving the community in tourism planning will increase the probability of the efficiency of tourism development in a more reasonable way in which they are regarded as the part of the tourism product.

METHODOLOGY

In order to investigate the importance of community involvement in planning developments exploratory research has been conducted. The sample for the research consists of the residents who live in the Famagusta in North Cyprus. The five-point Likert scale was used, ranging from 1 (strongly oppose it) to 5 (strongly favor it), to response to the survey-instrument. All of the survey-instruments were back-translated (Aulakh and Kotabe, [1993]) to be employed in North Cyprus, Famagusta residents. The questionnaires were adopted from Var, Sirakaya, and Choi [2002], in cooperation with Texas A&M University, which has conducted a survey on community opinion on tourism policy-planning developments. The data collection method relied both on secondary and primary data. The sampling method of the research relied on random sampling where respondents have been selected randomly, and the simple random sampling method has been used where names were chosen, from a telephone directory, using random number tables. A total of 260 questionnaires were distributed to residents and only 238 questionnaires have been found to be useful, which makes a 92 % response rate for this research. Overall reliability is found to be coefficient alpha 0.81, which is at an acceptable level (Churchill, [1979]). In order to analyze the data descriptive analysis has been done and data were processed in the SPSS 8.0 for windows. One-way ANOVA have been also used to analyze the differences among the residents’ responses on the basis of their educational backgrounds and income levels. The data collected was interpreted and related to the relevant literature in order to draw some final conclusions, and make recommendations.



RESEARCH FINDINGS

Demographic Profiles of Respondents

Demographic profiles of the respondents which are shown in Table 1 show that 52.9 % of the respondents were male, while 47.1 % of the respondents were female. As for the age distribution, the age group of “25-40” (47.9 %) of the respondents formed the highest proportion of the research. The results showed that, 49.2 % of the respondents had lived for more than fifteen years in Famagusta, while only 2.1 % of them had lived there for less than a year. With respect to education, 38.7 % of the respondents were high school graduates, followed by university graduates with 34.5 %. As for the case of occupation, 17.2 % of the respondents were government officials, while only 4.6 % of the respondents were unemployed. In addition, the findings showed that, most of the respondents 38.7 % fell into “500 -1000 Y TL”, while 31.9 % of the respondents’ monthly incomes lie between “1000 - 2000 YTL”.



Variables	Frequency(F)	Percentage (%)
Gender		
Male	126	52.9
Female	112	47.1
Total	238	100
Age		
20-24	25	10.5
25-40	114	47.9
41-50	79	33.2
51-59	16	6.7
More than 60	4	1.7
Total	238	100
Education		
Primary School Graduate	2	0.8
Middle School Graduate	15	6.3
High School Graduate	92	38.7
Vocational School	30	12.6
University Graduate	82	34.5
Masters Degree	17	7.1
Total	238	100
Marital Status		
Married	133	55.9
Single	91	38.2
Divorced	14	5.9
Total	238	100
Occupation		
Self-employed	29	12.2
Research Assistant	4	1.7
Lawyer	4	1.7
Banker	14	5.9
Teacher	28	11.8
Government Official	41	17.2
Engineer	8	3.4
Businessman	8	3.4
Housewife	17	7.1
Architecture	6	2.5
Accountant	7	2.9
Student	19	8.0
Doctor	19	8.0
Director/manager	8	3.4
Retired	9	3.8
Technician	6	2.5
Unemployed	11	4.6
Total	238	100



Table 1 (continued)

Variables	Frequency (F)	Percentage (%)
Settlement		
Less than a year	5	2.1
1-3 years	6	2.5
4-6 years	13	5.5
7-9 years	30	12.6
10-15 years	67	28.2
More than 15 years	117	49.2
Total	238	100
Income Level (monthly)		
0-499 YTL	48	20.2
500-999 YTL	92	38.2
1-1.999 YTL	76	31.9
2-2.999 YTL	19	8.0
3-3.999 YTL	3	1.3
More than 4 YTL	0	0
Total	238	100

Table 1. Demographic Breakdown of the Sample for Main Study (n=238)

Table 1. Demographic Breakdown of the Sample for Main Study (n=238)

Descriptive Analysis

A low score item and a high score item would suggest a respondent is prone to socially desirable responding (Nancarrow and Brace, [2000]). As means are shown in between three and four it seems that there is a low social desirability response bias. As is shown in Table 2, in overall, the respondents carry positive attributes towards their “support for tourism planning development”, which means that they favour tourism development within the community they are belong to, with the mean above four. For instance, respondents are shown to carry positive attributes towards “opinion in tourism industry in the community”, “support the development of new tourism attractions in community”, “community should make efforts to attract more visitors”, “support the local taxes for tourism development”. On the other side, the results also showed that, respondents have negative attributes towards “being against new tourism facilities attracting more tourists”, “community should restrict new tourism development”, “the role of community in the economy” while means are to be shown below three.

Moreover, respondents carried positive attributes towards environmental concerns. For example, “community environment must be protected now and in the future”, “the diversity of nature must be valued and protected”, “tourism must be developed in harmony with the natural and cultural environment”, “regulatory environmental standards are needed to reduce the negative impacts of tourism development”, are all shown to be positive with means above four. On the other side, respondents showed negative attributes toward “I often feel irritated because of tourism in my community”, and “community is overcrowded because of tourism”. Respondents carried positive attributes towards economic concerns. For instance, “I believe tourism is good for my community’ economy”, “I like tourism because it brings new income for my community”, and “Tourism creates new markets for our local products” are all shown to be positive with means above four.



In terms of policy-planning developments within the community respondents mostly showed positive response such as, “the tourism industry must plan for the future”, “I believe that successful management require advance planning”, “I believe tourism planning needs well-coordinated planning”, “tourism development plans should be continuously improved”, and “the tourism industry must contribute to community improvement funds” with means above four.

Respondents also showed positive attributes towards community involvement in tourism planning-policy developments. For instance, means are shown to be above four for “full-participation in tourism decision-making, by everyone in the community, is a must for successful tourism development”, “community’ residents should have an opportunity to be involved in tourism decision-making”, and “I think community’ residents must be encouraged to assume leadership roles in tourism planning committees”.

Table 2

Variables	Mean	Standard Deviation
Opinion in tourism industry	4.28	0.86
I support the development	4.33	1.01
I am against new tourism facilities (R)	1.90	1.19
I support the use of local taxes	3.34	1.23
The community should restrict (R)	2.74	1.45
I believe my community should	4.63	0.71
Role community should have ..	2.23	0.54
I think tourism developers strengthen...	4.42	0.70



Table 2 (continued)

Variables	Mean	Standard Deviation
Community environment must be protected	4.39	0.79
Diversity of nature must be valued...	4.46	0.79
Tourism must protect the community environment	4.24	0.83
Proper tourism development requires that wildlife...	4.28	0.79
Tourism must be developed in harmony with...	4.61	3.83
Regulatory environmental standards are needed...	4.17	0.93
Tourism improve the environment for future generations	4.31	0.86
I often felt irritated because of tourism ... (R)	1.86	0.84
Community's recreational resources are overused... (R)	3.02	1.11
Community is overcrowded because of tourism... (R)	2.82	1.23
I do not feel comfortable or welcome in local tourist... (R)	3.84	1.03
I believe the quality of the environment ... (R)	1.95	1.01
I believe tourism is good for my community' economy	4.09	0.83
I like tourism because it brings new income...	4.11	0.87
Tourism creates new markets for our local products	4.41	0.64
Full-participation in tourism decision-making...	4.05	0.81
The tourism industry must embrace the values of the...	3.83	0.94
The tourism industry must plan for the future	4.31	0.68
Community' residents should have an opportunity...	4.16	0.82
Sometimes, it is acceptable to exclude community'...	3.07	0.95
I think community' residents must be encouraged...	3.84	0.91
I believe that successful management require...	4.42	0.66
When planning for tourism, we cannot be short-sighted	4.47	0.70
I believe tourism planning needs well-coordinated...	4.56	0.67
Tourism development plans should be continuously...	4.60	0.53
Community attractiveness is the core element of...	4.34	0.96
The tourism industry should obtain at least...	4.40	0.91
I think tourism businesses should hire at least...	4.50	0.84
The tourism industry must contribute to community...	4.48	0.65
Community's residents should receive a fair share of...	4.22	0.91
Community's residents should be given more...	4.36	0.92
Community's residents should have the right ... (R)	4.25	4.70
The residents' daily life should be respected... (R)	3.79	0.96
I believe we need to take a long-term view when...	4.20	0.89
Tourism development decisions should be left to the...	4.24	0.94
The residents' daily life should be respected... (R)	3.79	0.96
I believe we need to take a long-term view when...	4.20	0.89
Tourism development decisions should be left to the...	4.24	0.94

Notes: Each item is measured on a five-point scale ranging from "1=strongly oppose it" to "5=strongly favour it". (n=238). (R) Indicates the reversed coded items which have been converted to positive from negative.

Notes: Each item is measured on a five-point scale ranging from "1=strongly oppose it" to "5=strongly favour it". (n=238). (R) Indicates the reversed coded items which have been converted to positive from negative.

Table 2. Descriptive Analysis of Residents' Perceptions towards Tourism Planning Development (n=238)



Differences among the Residents' Responses on the Basis of Their Educational Background and Income Levels

One-way ANOVA was to detect the differences among the residents' responses on the basis of their educational background, and as well as the income levels. By using One-way ANOVA to compare mean of "income level" and respondents attributes towards tourism development and community involvement, several significant differences were identified (see Table 3). In other words, significant differences are found among income levels of respondents while they were responding to the study variables. Out of 43 survey instruments 27 questions showed significant differences among residents' responses towards tourism development and community involvement in tourism planning. For example, (Q17) "full participation in tourism decision-making, by everyone in the community, is a must for successful tourism development", (Q36) "tourism development decisions should be left to the local authorities and developers", and (Q14) "I believe tourism is good for my community' economy" and other questions which have been shown in Table 3 are found to be having significant differences. This means that, income levels of the respondents' mattered while they were responding to those study variables.



Variables	F-Values	Significance
What is your opinion for tourism industry in the community.	3.03	0.018*
I am against new tourism facilities attracting more visitors.	4.89	0.001*
I support the use of local taxes for tourism development.	15.5	0.00*
How important of a role do you think should have in the economy in your community.	3.64	0.007*
My community's environment must be protected now and for the future.	2.43	0.048*
Tourism must protect the community environment.	3.16	0.015*
Regulatory environmental standards are needed to reduce the negative impacts of tourism development.	5.15	0.001*
I believe tourism improve the environment for future generations.	2.71	0.031*
My community's recreational resources are overused by tourists.	2.47	0.045*
My community is overcrowded because of tourism development.	5.55	0.00*
I do not feel comfortable or welcome in local tourist businesses.	2.54	0.040*
I believe tourism is good for my community' economy.	3.72	0.006*
Tourism creates new markets for our local products.	3.00	0.019*
Full participation in tourism decision-making by everyone in the community, is a must for successful tourism development.	4.51	0.002*
The tourism industry must embrace the values of the community' residents.	6.34	0.00*
The tourism industry must plan for the future.	6.80	0.00*
Community' residents should have an opportunity to be involved in tourism decision-making.	5.58	0.00*
I think community' residents must be encouraged to assume leadership roles in tourism planning committees.	2.69	0.032*
Community attractiveness is the core element of ecological "appeal" for visitors.	3.97	0.004*
The tourism industry should obtain at least one-half of their goods and services from within the community.	2.54	0.040*
Community's residents should receive a fair share of benefits from tourism.	4.73	0.001*
Community's residents should have the right to say 'no' to new tourism developments.	7.38	0.00*
The residents' daily life should be respected by tourists.	3.17	0.015*
Tourism development decisions should be left to the local authorities and developers.	2.56	0.039*

Notes: *Significant at the 0.05 level.

Table 3. Differences among the Residents' Responses on the Basis of Their Income Levels (n=238)

Notes: *Significant at the 0.05 level.

Table 3. Differences among the Residents' Responses on the Basis of Their Income Levels (n=238)



The findings of the study have revealed that significant differences were found among the educational background of respondents while they were responding to the study variables. Differences can be seen in Table 4, which means that the educational backgrounds of respondents matter while responding to the study variables. 29 questions were found to have significant differences between residents' responses towards tourism development and community involvement in tourism planning. For instance, (Q14) "I believe tourism is good for my community' economy", (Q20) "Community' residents should have an opportunity to be involved in tourism decision-making", (Q22) "I think community' residents must be encouraged to assume leadership roles in tourism planning committees" and other questions which have been shown in Table 4 are found to have significant differences. It means that, the educational backgrounds of respondents in Famagusta matter while they are responding to the survey variables.



Variables	F-Values	Significance
What is your opinion for tourism industry in the community.	3.58	0.004*
I support the use of local taxes for tourism development.	2.60	0.026*
The community should restrict new tourism development in my community.	2.77	0.019*
How important of a role do you think should have in the economy in your community.	5.08	0.00*
My community's environment must be protected now and for the future.	5.33	0.00*
The diversity of nature must be valued and protected.	6.38	0.00*
Tourism must protect the community environment.	3.29	0.007*
Proper tourism development requires that wildlife and natural habitats be protected at all times.	3.97	0.002*
I think community' residents must be encouraged to assume leadership roles in tourism planning committees.	3.47	0.005*
I believe tourism improve the environment for future generations.	3.51	0.004*
I often feel irritated because of tourism in my community.	3.12	0.009*
My community's recreational resources are overused by tourists.	2.73	0.020*
My community is overcrowded because of tourism development.	5.16	0.00*
I believe tourism is good for my community' economy.	4.13	0.001*
I like tourism because it brings new income for my community.	2.71	0.021*
Tourism creates new markets for our local products.	3.90	0.002*
The tourism industry must embrace the values of the community' residents.	2.70	0.021*
Community' residents should have an opportunity to be involved in tourism decision-making.	4.01	0.002*
Sometimes, it is acceptable to exclude community' residents from tourism development decisions.	3.15	0.009*
I believe that successful management require advance planning.	3.03	0.011*
When planning for tourism, we can not be shortsighted.	2.59	0.026*
I believe tourism planning needs well-coordinated planning.	4.60	0.00*
Tourism development plans should be continuously improved.	2.45	0.034*
Community attractiveness is the core element of ecological "appeal" for visitors.	4.40	0.001*
The tourism industry should obtain at least one-half of their goods and services from within the community.	2.79	0.018*
Community's residents should be given more opportunities to invest in tourism.	2.64	0.024*
The residents' daily life should be respected by tourists.	2.26	0.049*
I think tourism businesses should hire at least one-half of their employees from within the community.	4.95	0.00*
Community's residents should receive a fair share of benefits from tourism.	2.48	0.032*

Notes: *Significant at the 0.05 level.

Table 4. Differences among the Residents' Responses on the Basis of Their

Notes: *Significant at the 0.05 level.

Table 4. Differences among the Residents' Responses on the Basis of Their Educational Backgrounds (n=238)



Discussion and Conclusion

This study's aim was to measure the residents' perceptions towards "community" approach to tourism planning developments in North Cyprus. In this content, in order to examine and evaluate the importance of community involvement, this study employed questionnaires developed by Var, Sirakaya, and Choi [2002], in cooperation with Texas A&M University. Survey instruments were based on, tourism policy, planning, community involvement, environment, social, and economic impacts of tourism, in order to measure the perceptions of community on the stated issues.

Study results demonstrate that respondents carry positive attributes towards tourism development within the region. Results are found to be consistent with the relevant literature. For instance, the literature suggests that policy-planning developments should be continuously improved within the place where tourism activities take place. Moreover, sustainable development of tourism needs to be in the harmony with the environmental and social standards.

Furthermore, community involvement to the tourism development, environmental impacts of tourism and the need for conservation the environment, importance of economic benefits of tourism development are shown to be having positive attributes by the respondents. In the light of the mentioned findings, it is obvious that local residents of the Famagusta support tourism development and they show importance on policy-planning developments in order to sustain and preserve tourism assets. Descriptive statistics results also showed that residents' perceptions on community involvement to tourism planning are important due to their favor of "full-participation in tourism decision-making by everyone in the community is a must for successful tourism development". Famagusta residents also supported that, "community residents must be encouraged to assume leadership roles in tourism planning developments" in North Cyprus.

The research findings from this study have also suggested that there is significant difference among Famagusta residents perception towards tourism development according to their income levels and educational backgrounds. For example, (Q25) "I believe tourism planning needs well- coordinated planning", (Q26) "tourism development plans should be continuously improved", (Q29) "I think tourism businesses should hire at least one-half of their employees from within the community", (Q21) "sometimes, it is acceptable to exclude community' residents from tourism development decisions", (Q15) "I like tourism because it brings new income for my community", (Q18) "the tourism industry must embrace the values of the community' residents", (Q16) "tourism creates new markets for our local people", (Q23) "I believe that successful management require advanced planning", are shown to have significance difference while respondents were responding to the survey instruments according to their educational backgrounds.



On the other hand, the findings of the study reveal that there are significance differences among the income levels of respondents. For example, (Q7) “regulatory environmental standards are needed to reduce the negative impacts of tourism development”, (Q4) “tourism must protect the community environment”, (Q29) “I think tourism businesses should hire at least one-half of their employees from within the community”, (Q28) “the tourism industry should obtain at least one-half of their goods and services from within the community”, (Q34) “the residents’ daily life should be respected by tourists”, (Q30) “the tourism industry must contribute to community improvement funds”, (Q31) “community’s residents should receive a fair share of benefits from tourism” also showed that there is significant difference among residents responses according to their income levels.

Finally, as mentioned in literature, community involvement is needed in the development of policy-and planning for the tourism for sustainable development of the country within the competitive environment. Famagusta residents also perceive that community involvement is crucial for successful tourism development in North Cyprus and full-participation from everyone in the community is needed in order to achieve long term success.

In today’s highly competitive environment, tourism has a great impact on communities’ socio-cultural, environmental and economic lives. Thus, minimizing tourism’s negative impacts and maximizing the positive ones become crucial for the countries, in order to be able to compete in this environment.

Tourism in North Cyprus is one of the most important economic leading sectors. The development of the industry must be focused on the sustainable tourism development. In this context, planning and policy processes must be done properly by considering the importance of the tourism development on the island in the most appropriate and proper manner. Therefore the importance of planning and policy is crucial due to the need for sustainability on the island’s development. Not only the policy-planning processes, but at the same time implementing those plans together with the community is crucial. As it is mentioned before, while determining planning activities which raise issues of pollution, planning authorities have a statutory requirement to consult a number of bodies including public authorities, NGOs, tour operators, intermediaries, accommodation establishments, residents and tourists etc. Moreover, it should not be overseen that, planning is the purposive process in which goals are set and policies elaborated to implement them. Thus, importance of community participation in tourism development while planning and implementing those plans is significance for the mutual benefits of all parties in the countries.

Consequently, by conserving the importance of the environment, maintaining the quality of the visitor experience, and providing the benefits for local communities by ensuring that tourism planning is undertaken as part of overall development plans for any area, and that plans for the short, medium, and long-term encompass these objectives which are crucial for the future sustainability of the island.



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THE IMPORTANCE OF ENVIRONMENTAL MASTER PLANS: A SOCIOLOGICAL APPROACH

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The progress of modernization; excessive consumerism, industrialization and alarming population growth stemming from rapid and erratic urbanization; and the ensuing environmental problems spilling across borders are all seriously threatening human health. Educated people are aware of all of these negative developments but, unfortunately, the relevant national and international authorities have largely turned a deaf ear to them.

For the solution to these problems with direct regard to the management dimension, there is a need for a much more dynamic and different approach to the solution, one which directly involves management, and which requires both research and foresight. If human beings are going make their own life plans and continue to progress accordingly, comprehensive planning for environmental living is required. Despite the constant emphasis on the importance of planning, unfortunately in our country of Turkey as well as internationally, this is not being done in a thorough manner. Urgently and according to each nation's reality, it is necessary to carefully prepare comprehensive urban master plans. If these plans are prepared together in cooperation with the networks of organizations within the cities, national development can take place and, at the same time, the city fabric can be healed and environmental consciousness take hold.

In this study, it is shown that every city plan and especially master plans need to be redone in a cooperative effort with the goals of protecting living standards and the environment. In addition, in the process of making master plans more complete through local, national and international cooperation, public benefit side by side with sustainability must have the support of public policy. It is indicated that, with this approach more effective results are obtained through realistic assessment of the situation at hand. In addition, the proposition that neither city plans nor master plans are complete without environmental master plans that give high priority to the public benefit is evaluated from a sociological perspective.

Keywords: *Urban, Environment, Planning, Environmental Master Plans, Sociological Evaluation*



INTRODUCTION

The necessity of people to live in close proximity to each other continually brings to mind the way in which government and the governed will interact with regard to the multiple problems and needs of human beings. Owing to the incredible technological advances and inventions that have deeply affected human life, continuous steps have been taken toward development and modernization. Along with this, however, human history reveals that solutions to the problems of technological development have been insufficient to human happiness and peace of mind and that there have emerged new, extremely difficult to solve problems facing humanity.

In particular, industrialization and rapid urbanization, accompanied by rapid population increases, have upset the ecological balance; the impact of rapid destruction of living spaces on the human psychological state has led to moral decline and behavioral changes that, in turn, have brought to the agenda distrust in human relations, anxiety about the future, alienation from the environment and nature, emphasis on profits and speculative revenues and tendency toward destructive pathologies: in sociological terms, “the decline that accompanies prosperity.”

From the human sociological standpoint, following on the establishment of the social order, the growth of populations, the transfer of cities from empires to nation-states and, overlapping all these, industrialization, we are confronted with the socioeconomic fact that, along with these developments, environmental architecture has been carried to the agenda by its patron, modernization. In short, the fact of modernization also results in rapid and erratic urbanization and excesses in consumption, industrialization and population size. Interest in proposals for solutions regarding environmental problems is evident in view of the ongoing dwindling of natural resources and the environmental pollution and destruction that directly threaten the health and the future of humanity.

All of these negative developments have influenced scientists from the start but even when they address them, unfortunately the necessary national and international authorities have remained deaf to this problem. There is a need for a completely different approach, one that directly involves management, and this requires both research and foresight. Human beings are making their own life plans and continuing to progress accordingly, the same applies to the field of environmental living where comprehensive planning is also required.

In short, destruction of the social order and nature as well as uncontrolled population growth that is destroying the earth through unplanned industrialization, urbanization, construction, and soil and energy use are threatening every state and each individual family within it. Macro planning must be given priority; we must place limits on human activity within a master plan, particularly with regard to the environment.



ENVIRONMENTAL CONSCIOUSNESS AND PLANNING

Consciousness with regard to environmental protection is closely connected to a nation's development level, although actions that have adverse effects are not to be exclusively assessed within the framework of development and modernization.

One basic question is whether or not some processes pursued for the sake of human welfare and the quality of goods and services—for example, the advertisements etc. for a product that pollutes the environment—are destroying the environment and its values. Environmental protection and economic growth (sustainable development), therefore, need to be considered in tandem, while the developed countries have to be directly concerned about them. Indeed, in the name of the new generations of the world's peoples, all nations need to take responsibility and be more sensitive to these issues.

In solving the difficult problems we have attempted to put forth, of foremost importance are the political decisions of the political power directly responsible for the administration, along with the psychological fundamentals and sociological parameters. This is because these negative developments stem from political behavior, all the sociological institutions and the political power. In other words, the interests of those requesting favors and those providing them in the public and ecological areas always overlap.

Also personally involved in these actions are the leaders, cadre and managers of political administrations who, through the support of corrupt pressure groups and lobbies, set the stage for these disorganized, unsound, unplanned, unhealthy developments. This soon leads to the same behavior in all countries for the same reasons. When we add to this today's global capital and the world trade volume that it affects, we can say that it has not been easy to solve the environmental problems whose intensity and number varies depending on the country observed.

In order to be able to prevent environmental destruction and establish ongoing environmental protection, adjustments in environmental law can play a role, although the legal framework cannot achieve it alone—this, because the environment's most important base is the use of nature by humans and their institutions and the extent of the relations with government and the resulting organizational relationships. For this reason, from the sociological perspective, there is a basic moral need for environmental understanding, implemented quickly by means of an environmental master plan and, in this setting, the development of a cooperative approach. Although the environmental law contains provisions to discourage the polluters, to compensate for the harm they have caused (the principle that the polluter pays, for example), this law is not sufficient to put an end to environmental problems, to fully perceive these problems and to define who is entitled to deal with them. For this reason, from the sociological perspective, there is a very large ongoing duty to instruct everyone from the family to the school, from civil organizations to state bureaucrats and, especially political leaders, media and working people, about the necessity of cooperating to give environmental protection first priority.



In this connection, a new understanding of environmental management agreement and planning must be brought forth. Here we can touch on a new model and the concepts associated with it: Sociologically based political ecology management that conforms to cultural components of a bio-psycho-social behavioral pattern. This advanced model proceeds from urbanism, regionalism, nationalism and the whole earth: in short, forming a morally holistic city environment, a city with a sociological pattern in an environmentalist network of individuals, groups and institutions organized within the framework of the political ecology, and, within this network, all people giving priority to incorporating this paradigm into their own behavior. To help shape public opinion about sociologically comprehensive environmental master plans and increase the level of consciousness nationally, this planning needs to acquire public backing, which indeed is the only feasible way toward its successful management.

SOCIOLOGICAL DIMENSIONS OF AN URBAN NETWORK PLANNING MODEL

The rapid and unstoppable increase in the human population is bringing about the necessity to completely renew human living spaces. The first thing that is considered in this process has been to address only the narrow and immediate requirements of normal daily life; however, it has become clear that the ever-increasing problems of urban living require longer-term and lasting solutions. In particular, life in the city and its suburban industrial and trade centers, demographic settlement and uniquely urban structures, highways and streets—in other words, the urban fabric and workplaces—have had to be included in renewal. Urban and national leaders have applied the term “city planning” to this more rational approach.

Although priority has been placed on the economic and industrial base, planning has been directed at nearly every area of life including the agricultural sector. The idea of planning essentially came from a form of collectivist management and an ideology requiring centralized management, which is why important changes occurred in the building of cities as a result of industrialization in 19th century England; also contributing was the progress of the social state system, brought to the agenda and gradually assimilated by most European regimes. “Debates in the geography, sociology and city planning fields, clearly show the difficulty of evaluating the changes occurring in the cities, not only in certain sections, but also in whole economies, nationally and even internationally” (Sönmez, 2005, p. 1).

Whenever a plan to put order in the city life comes to the agenda, it has worked better when established by those in the city who want to protect the urban fabric: separating by main arteries and secondary roads the designating work and shopping and business areas, recreational space and neighborhoods, small islands and housing units (Keleş, 1980, p. 69). This activity has come to mean “urbanization”; “basically, it is people’s expressing their unity with the city. The concept of unity here would generally mean one population group combining or blending in with a larger population group” (Es and Ateş, 2004, p. 214). On the other hand, in this process, extending into the countryside are a lot of sizeable parcels of settled land, but policies for transporting and marketing the produce have been lacking. Issues like building refrigerated storage buildings and improved processing, packaging and storing of fruits and vegetables have come on the agendas of the national and city administrations.



PLANNING IN THE DEVELOPMENT OF THE URBAN NETWORK IN TURKEY

In Turkey, as in the rest of the world, the basic conditions in working class areas around factory and industrial facilities of cities are acquiring a new face; rapid immigration waves in particular are behind the rise of a number of interconnected psychological problems. Urban managers and political groups, along with capital owners and building contractors attempt to capitalize on these problems, while populist politicians seek support from citizens with a variety of unfulfilled promises yet still get elected.

While the rapidly increasing problems are pressing for solutions, the capital group controlling the state apparatus, meanwhile, have entrenched within the bureaucracy and technocracy a system of support and awarding of contracts to contractors from groups of people originating from the same villages or towns. Temporary cosmetic solutions and narrow environmental planning activities that serve special interests are presented to the public as “development plans.” For these reasons, the concept of what it means to become wholly an urbanite and display urban behavior in an urban conscious neighborhood, was put on the table for consideration, as was even the concept of “anti-urban crime” particularly at the beginning of the 1990s, to represent an unprotected, unsafe city that has gotten out of control. Gradually thereafter more violent incidents and widespread forest fires began to occur. Virtual plundering of farmlands, workplaces extending into burned forest areas, unauthorized slums and unplanned building developments have all continued under control of well-defined groups. Those originally in charge of the cities are helpless in the face of this plunder and even denigrated by the recently formed immigrant regional groupings within the cities. The reason is that in this negative process, those regional groupings that are gradually plundering the cities have, like all such groups, a unifying ideology and a claim to superiority that excludes others” (Tekeli, 2001, p. 172). Clearly the waves of crime and variety in the types of crime have increased. There is even voice given to public pressure for new interpretations and searches in the penal code that would turn some crimes into innocent activities, some of which have started to be granted amnesties.

This approach has been considered in connection with legal psychology. As for the philosophical justification, “the Criminal Law must know the human being and infiltrate its deepest corners, because the roots of guilt run deep in the human mind, and basic circumstances consisting of one incident not brought out into the open” (Erem, 1977, p. 1) has been its motto. This means that in order to understand the reasons for human actions, human biological and psychological makeup must be known and studied; for an individual’s socialization process to be completed, he must be made conscious of an environmental protection psychology. For this reason, within our previously mentioned moral basis for environmental psychology, the functioning of the psychological process that we have contended becomes our priority evidence. Besides, there are cities, institutions and organizations having a sociological character that represent the social structure. The common values, beliefs, and traditions that formulate these relationships are the products of sharing and have cultural content. Therefore, all of these arguments are the work of the political powers that are supposed to manage the natural habitat and activities. In observing this as a whole, if we consider that almost everything related to human life, is located in urban life, the model that we have put forth represents an urban fabric and implies a multi-factor sociological network of social relations.



The psychological makeup of city dwellers whose relationships are marginalized through their lack of understanding and prejudice toward these urban values (to put it simply, those who cannot display an urban behavior) cannot incorporate environmental action into the functioning city fabric. It is necessary to build a consciousness of national belonging on a morally based environmental psychology (Tuncay 2005). A city is harmed by decisions that lack urban consciousness, that are based on populist recommendations from regional, local and special interest group pressures and special interests of immigrant groups. This is why at some point anti-environmental activities and actions are anti-urban acts. The environment is not being managed correctly. Yet, in Turkey this negative development continues to be pointed to as “planning with the people’s support and guidance,” and is even carried to the agenda from the mouths of the highest level state officials, ministries and prime minister. Unfortunately, all that the public is hearing regarding environmental management is this so-called “voice of the people” on the state radio and television channels.

Amid the constant changes taking place in the cities, in order to achieve understanding of the city and find solutions to its accumulated problems, public supported planning is a must. The solution is extremely difficult, because of social or political pressures, as well as the weakness of ecological policies. We know this is the reason why the State Planning Organization often revises its ongoing plans or even completely changes their targets.

Planning has acquired a negative reputation in Turkey. The idea of planning can contribute positively to public life if plans indicate how the public will benefit and how the plans are to be carried out. Therefore, in planning and realizing the plans, experts and their organizations have to let the people take the initiative and have to create sociological interaction within the urban fabric. In a sense, to satisfy the public means virtually turning it over to organizations and institutions, from trade unions to employers, architects, engineers, doctors, hospitals—in short to everyone, from the family to, especially, those academicians who do not have a record of intellectual fraud, who can ethically and effectively carry the models forward without destroying them. Plans without public involvement and support neither contribute to living nor are feasible and can always become a topic of debate. After this stage, the political power, as it represents the concept of political ecology, will step in and join in the effort to realize all plans through operating at the legal level. Representative democracy is shaped according to the honesty, attributes and abilities of the representatives. Yet, democracies can only exist through their participatory quality. That is what is termed today participatory democracy. To participate is to take part in the system. Whatever one’s position may be, one can neither defend the system and its sustainability, nor take up any action in this regard.

In order to approach a plan on a sociological basis with an eco-political approach; urban planning, which is the basis of urban sociology and urbanology, has to coincide with regional planning, most particularly the type that concerns environmental sociology. Taking it a step further, all the separate plans need to be combined into one “Environmental Master Plan.” Instead of just ministry decrees and authorizations exercised from the top down, many hands in many different institutions and organizations must join in partnership to realize master plans. This is not an abstract concept or a debate about strengthening local administrations, in view of the fact that a federative structure would not work. The people’s participation on a national scale is essential. Thus, this interactive and functional approach does not imply only the ministries’ representations in the local areas, but rather a broad platform carried out in each province. This sociological construct, which will represent organized and unorganized individuals, is the formation that will build an urban network.



These master plans are on an urban network model whose goals reach from the local to the national and from the national to the international. This model is to represent all the institutions and organizations in a city. Individuals are to be selected from their neighborhoods, and responsible in the city districts are to be designated. One man and one woman from every neighborhood as well as from every institution and organization need to be designated. From the start, the universities in particular are to collect the technical information and know-how to be spread out among all the participants, and decisions made with a quorum ratio of 2/3 are to be passed on to the ministries by administrative councils.

Finally, the representatives of the established eco-political power can, with the help of professionals, examine what needs and does not need to be revised and then present this to the government, whose task is to carry it through the parliament and into law. At the same time, because the urban network model is an autonomous type of institution that produces public-supported policies, the decisions of the political power will also be influenced and the chances of the accurateness of the plan will be increased. The budget of this formation will be prepared under the law as a citizen-supported planning fund and will establish a system of payment by people originating from the same community and residing there in exchange for administrative services.

Up to the present, it is clear that the various plans, jobs and reports of the ministries and various institutions and organizations have not achieved the desired level of environmental management. As reported in the media daily, we are experiencing a constant succession of alarms regarding the environment: They report that environmental destruction is increasing fast and that we will be unable to pass on our disappearing forests and historical and cultural treasures as a legacy to future generations.

LOCAL TO NATIONAL, NATIONAL TO INTERNATIONAL

Therefore, it is necessary to upgrade a multi-faceted planning from the local to the national levels, considering our entire natural and human resources and values as being within a morally based framework of environmental consciousness, the governing and governed being directly involved, and management carefully developed with broader and more complete economic, sociological and technological knowledge. In our view, in order to achieve these, a new conception of environmental values needs to be assimilated into the urban network that is concerned with bio-diversity, which we have taken up in a different study (Tuncay et al., 2006). In urban network-based planning, environmental master plans should be conceived of as models but not yet fully finalized.

To create awareness of responsibility for the problems of a violent and aggressive social environment, to view the urban network within an ecological approach paradigm and to implement a comprehensive environmental master plan is to put quite a different face on modernity. This is a path that proceeds from the national to the international. It is sustainable and it requires cooperation, communication and interaction.

Countries all over the world continue to seek various solutions to the problems of the environment. Of foremost importance are environmental master plans that incorporate within them public supported planning and all other plans. They represent a comprehensive planning that consists of managing by democratic principles, incorporating environmental ethics and awareness into environmental science, and sustainable environmental management through all-encompassing environmental policies.



However, the “environmental design planning,” which is so often mentioned by experts and others interested in the environment, must feature within an environmental master plan. Less comprehensive and far from coordinated and controlled, environmental design planning often falters at the administrative level, and does not fully cover either the urban and rural social fabric or the land’s fabric. The term “urban network” means communicating with every individual and organization to be found within the city, and influencing responsible citizens who are conscious of their belonging there and the dimensions of what they represent; communicating this to inner city people; and then connecting, communicating and interacting with other people within the decision-making mechanism. In this connection, the definition of “city” includes not only “a new economic organizational structure and physically changed environment; at the same time it is a new and different social order shaped by human behavior and thinking”.

In the cities that gave rise to modernity, “the daily and social lives of each of us are constantly intermingling with others’ experiences.” (Eroğlu, 2005). People’s social relations with groups and societies, actions and behaviors shared among the society, as well as the processes of creating a social fabric through a common language, culture and art (Tuncay, 1998), are maintained under the influence of individual and group communication within the urban network thanks to certain expectations, a sense of harmony and contentment. These processes include factors, goals and planning that stem from individuals’ different perceptions, the complexity of social relations, the variety of actions aimed at different demands and expectations, or society’s quest for order, quality, security and welfare. The same way as the urban network makes short-term plans that address the needs of one individual’s daily life, social groups or even the whole society owes to itself to make more comprehensive and long-term communication and interaction plans for the sake of the continuation, orderliness and the welfare of the nation or rather nation-state. This approach should be taken by all the countries in the world notwithstanding the mountains and seas that separate them.

Since both urban and rural sociology study the individual’s relationships with the social environment on the basis of sociological data, observations and findings, the study of a chosen environmental master plan regarding human and natural resources, has to be done by the same method. More comprehensive, ongoing and scientific research is needed in these fields. This work model that can be qualified as a theoretical framework is approaching the subject from a different set of values, i.e., a paradigm. It includes a claim that environmental master plans cannot be left exclusively in the hands of the political power holders. Since anti-politician sentiments are reflected in public distrust, environmentalism’s search for a sustainable world must be brought to a solution under the coordination of expert environmental units. We propose the founding of an autonomous nationwide institution that will, in turn, operate an “Environmental Science Institute of Turkey” on the urban network model; such a scientific body with the kind of support that it can obtain can take part in the environmental management. In this connection, we would propose an “Environmental Applied Science and Research Institute” be founded at Ege University, because such a model operating locally is one that takes local realities into consideration and can lead to its adoption at the national level. Local managements can directly apply preventive-protective, restorative, developmental environmental policies to their own rules and administrative regulations. In order to be able to move into this sort of political life, the representatives of local managements need to possess environmental consciousness and sensitivity. All they need is to believe in the nation-state concept through a sense of “belonging” which lies at the core of a model based on “public field” and “public duty.” (Erkal, 2005). Thus can policies be realistic and successful, rather than populist, and people and their environment in both the center and the periphery can be managed together harmoniously and cooperatively.



In this connection, we find very useful Turkey's 1st Conference on National Environment and Forestry Law decisions, although they address different units and assume different functions within a more specific understanding. They recommend that:

1. The Provinces Bank and the universities, in cooperation with local administrations, shall constitute a clearinghouse to provide guidance on infrastructure policies.
2. A permanent, complete and totally integrated waste management system shall be founded for the disposal of residential, industrial, dangerous, medical, electronic and other special waste matter.

In addition, of utmost importance is the mention of environment under the heading "Local Administrations and the Environment." That paragraph contains provisions that must feature within an environmental master plan, without mentioning it by the name. These are:

- A national plan, a district plan and environment system plans shall be prepared by the central administration; while local administrations shall prepare their local guideline plans and development action plans.
- State Land Use plans must of necessity be prepared.
- In order to prevent irrational development, building lots delineated for development and provided with substructure have to be established.
- In rural settlements as well, planned development shall be accomplished.

Nevertheless, all of these positive determinations do not pledge an approach that includes environmental master planning, though they would fit within a comprehensive master plan. All of these determinations are completely in place, and the only task at present is to connect the local level to the urban fabric, and the district level to the national basis; and to achieve a comprehensive master planning through regional-national-international cooperation and interaction. The Environment Center that we have proposed will handle the terminology more correctly and will comprehend its contents more accurately; it will help build the futurology of environmental science on an ethical basis appropriate for the environmental ideology. In this context, the nationwide, provincial, and environmental plans that fall under the responsibility of the central administration will be constructed on the basis of the environmental master plans that we have carefully laid out; will provide coordination, technical experts and, especially, involve the public in the process. Thusly, since assignments, powers and responsibilities cannot be frequently changed, the directions given in the plan will be implemented objectively, safe from politicians' whims, and according to the urban network model.

Relationships and communication among these sociologically organized institutions will lead them into a process of interaction that includes socio-psychological interaction. This will add a greater participatory capacity to the culling out of the local self-determination. It will lay a substructure for national policies, awakening an awareness of responsibility in the urban dwellers. The environmental management will concretize their policies and decisions by taking more serious control of their city's problems and strengthening the sense of national belonging, which at the same time strengthens the concept of nation-state. Since the cities' contacts and interaction among themselves will be livelier, the environmental management's dynamics of change and transformation speed will be accelerated. The outcome of all these will be the establishment of an urban awareness in light of all of the scientific data accumulated, and a consolidation of freedom with responsibility. Since in this model various public groups come face to face, as well as technical and advisory groups are established, events and facts throughout the process can be determined in such dimensions that draw the interest of all mankind and work toward a realistic future.



The management of the environment –even the democratic process relative to those problems and to proposals for solutions–can move forward more quickly through sociological participation and interaction based on psychology. With this model, a wholistic master planning and policies can be carried out. The list of topics that need to be studied within the urban network includes families, friendship groups, school and work environments, civil society, communications media, official institutions and political organizations; and, holding a special strategic and important place at the top this list, the political sphere that overlaps all of these. For, the relationships among all of these groups that have to do with the socialization process cause some positive/negative effect on the individual. They contribute to the transformation of individualistic attitudes and behavior into patterns of social behavior (Tuncay, 2001).

Urban planning has become the leading type of environmental planning. Of course, planning is a broad, comprehensive concept in itself. Of planning in general, its most characteristic focus is economic activity. The necessity for planning arose from the rapid developments in the industrial and service sectors, the entire manufacturing and consuming process, from the raw materials to the final products and their distribution. Relations between industry and the environment have kept company management and political administrators constantly busy; local administrators in particular have been faced with finding solutions to negative problems stemming from these relations.

In the march toward modernization in the West, a key concept was sought for solutions to these and similar problems. Therefore, the concept that is of current importance and to become even more so in the future is “planning as a child of enlightenment. Enlightenment has given us the faith that it can comprehend the regular processes of mind, nature and society and can convey this information back to us as comprehensible and communicable knowledge. This implies that an objective social science that can guide peoples’ actions is possible. If there is such a social science, it can be used for the purpose of social engineering. This also implies use of the technical mind in society’s orientation and transformation—that is, the birth of modern planning”(Tekeli, 2001).

Despite the view to the contrary in the West, Islamic thought also places importance on reason, described as “man’s greatest and most beautiful adornment.” Reason and intelligence-based planning on a scientific and engineering foundation also requires an environmental ideology born out of social idealism. In doing environmental planning, whether urban or rural, it is absolutely necessary to study group and societal formations and their processes of interaction. in order to be able to build on a sociological basis. Since environmental master planning referred to in this discussion can be built upon a sociological foundation, perhaps the city planners claims to being interdisciplinary can also be justified. To undertake a project in a specific sub-discipline of any scientific discipline does not mean to become divorced from the main field of study. For example, there are many sub-disciplines in sociology – urban, rural, environmental, communication, science and even leisure time sociology (Eroğlu, 2005). However, none of these departs from the method and evaluation of results that is used in general sociology.

Planning is a concept such that, using the terminology of one’s particular discipline whether studying an urban area or a village, one can make proposals and generalizations. Environmental master planning incorporates within its broad scope all the dimensions of planning – sociological, psychological and engineering, and so interdisciplinary scientific cooperation is required in the evaluation of environmental master planning, because anything one may wish to reach, accomplish, or realize, on a sustainable world is built upon the human being and the environment in which he/she lives.



Therefore a variety of definitions have been attached to the concept of the environment. A mainly economy-related environment focuses on centers of industrial concentration known as “core” areas. The districts where such concentrations do not exist are called “the environs” (Erkan, 1994). In Ertaş’ view; environment is the sum total of all humans and living things, the physical, the chemical and the social values that are affected instantaneously or continually, directly or in the surroundings.” Another definition is based on ecological balance: “the setting that is necessary in order to assure the development, preservation and continuing life of humans and all other living things” (Ertaş, 1997). Cangızbay adds, “In whatever connection the term environment is used, mainly it is defined with ‘an emphasis on the center and center points,’ the environment, in the sense of being the opposite of the center, is the ‘external’” (1998). Examining these definitions a little more deeply in order to form a new one, it would help to sum up what we view as so important about environmental master plans: In our view, the environment is all the living and non-living universe that humanity owns cooperatively; it is the external fields that affects, directly or through their surroundings, all physical, chemical and human resources, i.e. all natural and historical assets and cultural values, where conditions that influence communication, interaction and action take place.

The word “environment” encompasses whatever is outside the individual and remains so; what is very close to the individual and also very far away, those communicating with and either affecting him/her, or those to which he/she is indifferent, where he/she has to stay and live. In short, the environment is both close and far, is both nature and living beings. It also expresses all the technological phases and historical-cultural existence in the process of human history. On the other hand, “humanity becomes a species, with all the knowledge and abilities gained during the process of socialization; acquires the concept of “individual” as a concrete being through communication and interaction with social groups and institutions (Tuncay, 2002). Presently, this sequence is mostly taking place in urban networks and is considered the core of modernity.

This means that, along with the words “plan” and “environment,” the sociological concept of “individual” needs to be included in our work. Humanity is defined anthropologically as “the most developed living species, having ability to act intelligently, to use language and symbols from time to time to come to agreements and to use its talent to reason and thinking. Basically, the human is different from other living things through its values and beliefs established on a moral basis and its motifs coinciding with the environmental areas. Unlike humans, other living things live by instinct; a social being emerges from our ability to agree through use of the ability to speak, and, in accordance with our personalities, to engage in communication and interaction with others” (Tuncay, 2002). The human as a social being is presented in the sociological literature as the free individual, unfettered yet together within the society and the collective.

For the individual to live in society as a social being, means to live in a secure social order without destroying its future and living in harmony with that society. Although there are some measures to protect traditions, customs, rules and laws, nevertheless some developments can turn against society. Just as with individuals, these can carry lasting implications for individual, as well as for society. Recognizing and taking all this into consideration, humanity needs to be motivated within a centralized, foresighted system. Since the environment is also within this public dimension, the behavior of individuals must be explained as social facts. Plans as well need to be realized keeping this in mind.



Many environmental factors affect human behavior just as a myriad of human factors affect the environment. Therefore, an environmental master plan is a multi-sided synthesis of solutions to problems arising from these factors. From a sociological standpoint, social life within the proposed urban network is sustained through a process of interaction among all the individuals, groups, institutions and organizations in the society. Life goes on in the midst of the urban fabric that is made up of these interactions.

The focal point of planning, which of necessity is established on a sociological basis, is the groups and group dynamics. Among the sociological institutions and organizations are non-profit civil society organizations, including environmental groups that have an important helping role. Yıldırım (2005) and Erkal (2004) have both written about some of these internationally based organizations that have a vision of global influence and operate in Turkey with financial support from different countries. They point out that some have directed their work not only toward the environment and mining issues, but also have addressed such subjects as identity and democracy and, in cooperation with some local civil organizations, columnists and even fake experts, spread opposition to the nation-state and Atatürk principles; such entities thus begin to resemble paid soldiers in service of imperial powers. In our view, it is inadmissible, in the name of protecting the environment, for such groups to take up subjects in any country that question the right of nations to their independence and sovereignty.

We will focus our attention on truly functional democratic and civil organizations whose actions benefit the society and whose behavior is moral and fair and based on legal principles. Such organizations are exposing, through the dimensions and activities of their actions, how the environment is perceived. In particular, the audiences of these groups increase when they are volunteer organizations who address public issues. Because the group consciousness of these organizations is very high, they have an important role in enlightening the public. Aliye M. Aktaş elaborates on this subject in her work *The Group Process and Group Dynamics*, and makes the following points: There is a difference between the goals of organized groups in a society and their actual influence on that society, because of the different factors that bring them together. For example, according to one approach, the group's operating principle is symbiotic, based on mutual dependence of its members. Individuals one by one cannot satisfy their needs or realize their goals. The interaction and togetherness of interpersonal encounters determine the emerging tendencies of group formation.

Another approach is the social identity theory. This view supposes that psychologically an individual's group membership depends on his perception. Interpersonal and group behaviors are different. Here, personal qualities are not what are determining individuals' behaviors; rather it is the group memberships that they feel themselves attached to. Transitions between personal identity and social identity are tied to the functioning of the ego. Differences emerge from the interaction of the perceiver's personal characteristics and the surroundings. It creates personal self-esteem. This controls individual's behavior. Sometimes a person simply enters a particular social milieu as one apart and sometimes as one who identifies with the attributes of the group. In this manner he can be awakened socially and social behavior is thus controlled (Aktaş, 2001)



No matter how we look at it, a human being's behavior as an individual represents a sense of belonging. We have taken up this subject in more detail in a different work (Tuncay, 2005); for as we have stated already here, very important for the nation-state is the sense of belonging, in particular to the national soil and the cultural accumulation and values, symbolized by environmental values, and coupled with these, the public space and public awareness.

CONCLUSION

All economic and social support institutions, from the smallest family to the most highly people-intensive workplace, whether within their internal structures or from communication and interaction among themselves; and particularly those in the public arena and instruments tied to public duties, should comprehend the attitudes and thinking and the symbols related to public consciousness, and regard the environment and the related environmental master plans as an important public service.

In order to shape public opinion correctly, objectively and to the public advantage, we should point out that the media as a social institution has an important role. Of course, the educational institutions are at least as essential as the press in serving to motivate the public on environmental subjects, just as in all other areas. Nevertheless, politics as an overall institution places all of these situations and facts into a framework and organizes them legally. In all institutions and organizations, starting with the political parties, the decisions and operations should be negotiated, from bottom to top, taking in all opinions and then establishing their policies. In this way this model, which covers all countries and yet will be unique to each country, will join hands with those of other countries to form international collaboration. In Turkey, for example, all groups and citizens need to be made aware that democratic institutions, the nation-state, a sense of belonging, and thought and action that represent the nation's republic are the real bases for institutionalization. In all countries, this type of foresight regarding environmental understanding and action, in place of other expectations and secret investments and accounts, needs to be nurtured with the same sincerity and faith

From this angle, all these arguments are very important. The worldwide mushrooming of environmental problems that we observe today implies different things to almost everybody, because people perceive the myriad of problems according to their physical or social environment. Those problems can be specified as follows: air, sea, inland water and river or drinking-water pollution; toxic or non-toxic wastes; radiation hazard; devastation of forests; degradation of agricultural lands for industry and dwelling uses; uncontrolled spread of slums in non-designated areas; soil erosion and resulting desertification; depletion of non-renewable resources; destruction of nature protection zones; extinction of animal and plant species and decreasing biodiversity; diversion of historic and cultural assets for economic gain or other purposes; acid rains and global warming; hole in the ozone layer caused by overuse of fossil fuels and uncontrolled industrial production emissions—it is regrettable that the purchase of gas from under-developed or developing countries is making this problem worse; and noise pollution due to technology, the visual pollution due to houses built outside the legitimate development areas, are some of the immediate environmental problems.

Such problems can be solved only through comprehensive planning, which clearly cannot be accomplished only with the existing urban planning and environmental policies. It is essential to increase the national level of consciousness in order to implement environmental master plans that encompass entire countries. We are very late in insisting on this matter to resize from national to international. Late or not, it can contribute to making the earth more sustainable if it is given priority over nuclear testing, mining reserves, energy pipelines and national interests.



Turning away from the self-interest based power balance that favors those who control the technological, commercial and cultural aspects of global expansionism, which approaches virtual slavery, perhaps a new human rights-oriented consciousness will emerge in the understanding (Tuncay, 2004), as stated by Ümit Erdem (2000), “not environment for humanity, but rather, the environment with humanity.”

The following viewpoint of Paul Kennedy, an expert on globalization, is also worth noting. He said that, despite contentions that micro-national loyalties will become widespread, in the end, the nation-state will remain at the center of most people’s identity, and even though the state’s independence and functioning will be corroded by the effects of internationalism, there is no substitute for the key unifying role of the state in resisting globalization.

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PREDICTING URBAN GROWTH IN HOUSTON-GALVESTON-BRAZORIA CONSOLIDATED METROPOLITAN STATISTICAL AREA (HOUSTON CMSA)

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The Houston-Galveston-Brazoria Consolidated Metropolitan Statistical Area (Houston CMSA) has experienced rapid population growth during the past 3 decades and it is projected to reach approximately 7.5 million by 2030. Houston also is the only major US metropolitan area with no zoning regulations. Using SLEUTH, a spatially explicit cellular automata model, the spatial pattern of future urban growth within the Houston CMSA is predicted for the 2002 to 2030 period. The SLEUTH model is calibrated for local conditions in Houston using four historical urban extents, two land use layers, four transportation layers, slope layer, and excluded layer for the period from 1974 to 2002. The modeled SLEUTH, growth in the Houston CMSA is predominately “organic” with most growth occurring along the urban/rural fringe. Projected increases in urban area from 2002 to 2030 parallel projected increases in population growth within the Houston CMSA. From 1990 to 2000, the population of Houston CMSA more than doubled from approximately 2,000,000 to 4,600,000 and it is expected to grow by an additional 2,800,000 people by 2030. Secondly, urban growth in Houston over the past 30 years has epitomized the term urban sprawl because the urban area has quadrupled, growing from 941 to 3,724 km² from 1974 to 2002, and it is predicted to double by 2030, reaching 6,621 km².

Keywords: *Urban Growth, SLEUTH Model, Houston CMSA, Prediction.*

1. Introduction

Urban planners and other academics focused their attention on urban growth models in order to help understand, and potentially lower the negative effects of large-scale urbanization. Planning agencies have recently been integrating analytical decision making tools with traditional planning approaches to improve planning for their communities. Technologically based tools such as urban models and geographic information systems (GIS) can provide insight into different growth scenarios, enabling policy makers to more effectively use traditional planning tools (EPA, 2000). Geographic information developed to support growth management strategies can be incorporated into planning activities and environmental analysis.

Sprawl has been in effect with the exurban growth in our cities. Middle-class and wealthy residents are drawn out of the inner city into the suburbs and exurbs (Beale, 1977; Hodge & Qadeer, 1983; Davies, 1990). Higher taxes on farmland, demand for better public services, trespassing on farmlands, and displacement of farm families to the city are some of indirect impacts of exurban growth (Rodd, 1976; Bryant & Russwurm, 1979; Bryant, 1981).



Between 1900 and 1970 net migration in the USA was predominately from rural areas to urban centers (Wardwell & Brown, 1980). Since then, the nation's rural population fluctuated between 50 and 60 million, while the urban population increased nearly seven-fold to approximately 150 million in 1970 (Fuguitt et al., 1989). During the 1970s, the trend of net migration to urban centers reversed with large cities losing population to non-metropolitan rural areas and small cities with populations less than 25,000 residents laying on the urban fringe (Wardell & Brown, 1980). The largest net population growth rates in the 1970s were in the non-metropolitan counties adjacent to at least one metropolitan county (Johnson, 1989). A metropolitan county contains a city with at least 50,000 people or is part of an urbanized metropolitan area with a population of at least 100,000 (Myers, 1992). During the 1980's, the nation returned to the historical norm of rapid metropolitan population growth with net out-migration from rural areas to metropolitan areas (Fuguitt et al., 1989). However, population continued in non-metropolitan counties located adjacent to metropolitan ones (Johnson, 1989).

Population dispersion from city centers to the outwards in the USA and in other industrialized nations has been facilitated by advances in transportation and communication technologies, changes in labor-force composition, increases in personal affluence, and a reduction in rural-urban differences (Wardwell, 1980; Fuguitt et al., 1989). The lessening distance brought about by technological changes and by the expansion of transportation infrastructure has made rural landscapes in both metropolitan and adjacent non-metropolitan counties accessible for residential development. Because of the diversity of residential locations urbanization decisions are increasingly influenced by the quality of public services (Anas, 1982) and by the spatial distribution of environmental amenities and disamenities (Diamond & Tolley, 1982).

During the last 50 years, these migration patterns to and within metropolitan areas in the United States have caused rapid growth, transforming farmland, wetland, and forests into extensive urban landscapes. Research scientists and policy makers are paying attention to the consequences of urbanization as a result of the environmental impacts it produces. The widespread expansion of urban areas has been especially evident in regions that are undergoing rapid economic development. In such areas, problems arise when urbanization is poorly planned. Unplanned and uncontrolled urbanization results in sprawl, conversion of prime agricultural land to urban uses, and habitat fragmentation.

Houston, Texas, is an archetypical example of rapid expansion of an urban area in the United States. The Houston-Galveston-Brazoria Consolidated Metropolitan Statistical Area (hereafter referred to as the Houston CMSA) is among the nation's most dynamic and rapidly growing metropolitan areas. Between 1900 and 2000, the region's population more than doubled growing from approximately 2,000,000 to 4,600,000 (U.S. Census Bureau, 2000a). The population is projected to grow by an additional 2,800,000 by the year 2030 (The Perryman Group, 2002). Because Houston's areal growth over the past 30 years has been a prime example of urban sprawl and there is no reason to assume this growth mode will not continue in the future.



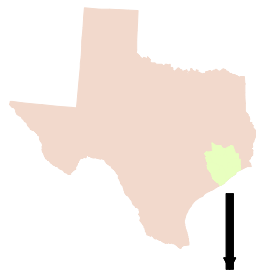
Any substantial increase in population usually has a negative effect on land because it requires the land, which is employed for other uses, to be converted to urban land. There has been a movement recently to develop urban simulation models that are designed to help understand the spatial expansion of urban areas (White & Engelen, 1993; Cecchini, 1996; Batty et al., 1997; Clarke et al., 1997; Clarke & Gaydos, 1998; Semboloni, 1997; White et al., 1997; Li & Yeh, 2000). These urban growth models follow in the long and distinguished tradition of the mapping and quantifying spatial patterns of urban growth (Tobler, 1970). Urban models have been developed to predict, describe, and analyze the spatial expansion of urban areas for research and policy purposes (Lee, 1973; Batty, 1976; Landis, 1994; Couclelis, 1997; Guhathakurta, 1999; Klosterman, 2000).

One of these new urban growth simulation models is the SLEUTH model. The acronym, SLEUTH, was compiled from the image input requirements of the model: Slope, Land cover, Exclusion, Urbanization, Transportation, and Hillshade. The SLEUTH model has been designed for easy portability to diverse regions throughout regional and global scale and SLEUTH has successfully predicted urban expansion in the San Francisco Bay area, the Washington-Baltimore corridor and in Lisbon-Porto, Portugal (Clarke et al., 1997; Clarke & Gaydos 1998; Silva & Clarke 2002). SLEUTH is currently being used to model urban growth in Chicago-Milwaukee, Portland-Vancouver, the Philadelphia-Wilmington and New York metropolitan areas (Gigalopolis, 2003). The model's validity can be evaluated by its ability to generate realistic urban patterns useful for scenario planning and various types of regional analysis. In this research, SLEUTH model is used to predict the future urbanization patterns in the Houston CMSA for the period 2002 to 2030.

2. The Houston-Galveston-Brazoria CMSA

Houston, Texas, presents an ideal metropolitan area for modeling spatial patterns in urban growth using SLEUTH model. First, from 1990 to 2000, the population of Houston more than doubled from approximately 2,000,000 to 4,600,000 and it is expected to grow by an additional 2,800,000 people by 2030. Secondly, urban growth in Houston over the past 30 years has been epitomized by the term urban sprawl. The urban area has quadrupled; growing from 941 to 3724 km² from 1974 to 2002. Thirdly, compared to many other cities, urban expansion in Houston is largely unconfined. Outside of water bodies and floodplains, there are few physiographic limits to Houston's growth. Because Houston is the only major city without a zoning plan (Vojnovic, 2003), urban growth there faces much less regulatory constraints than urban growth in many other cities in the United States.

Houston lies largely in the northern portion of the Gulf coastal plain along a 64 to 80 km. wide swath along the Texas Gulf Coast. The northern and eastern portions of the eight-county study area are largely forested, while the southern and western portions are predominantly prairie grassland. Perhaps the largest physiographic obstacle to growth in the Houston metropolitan area is surface water. The study area contains lakes, rivers, bays and an extensive system of bayous and manmade canals that are part of the rainwater runoff management system. Approximately 25%-30% of Harris County, which contains most of the city of Houston, lies within the 100-year flood plain.



HOUSTON CMSA COUNTIES

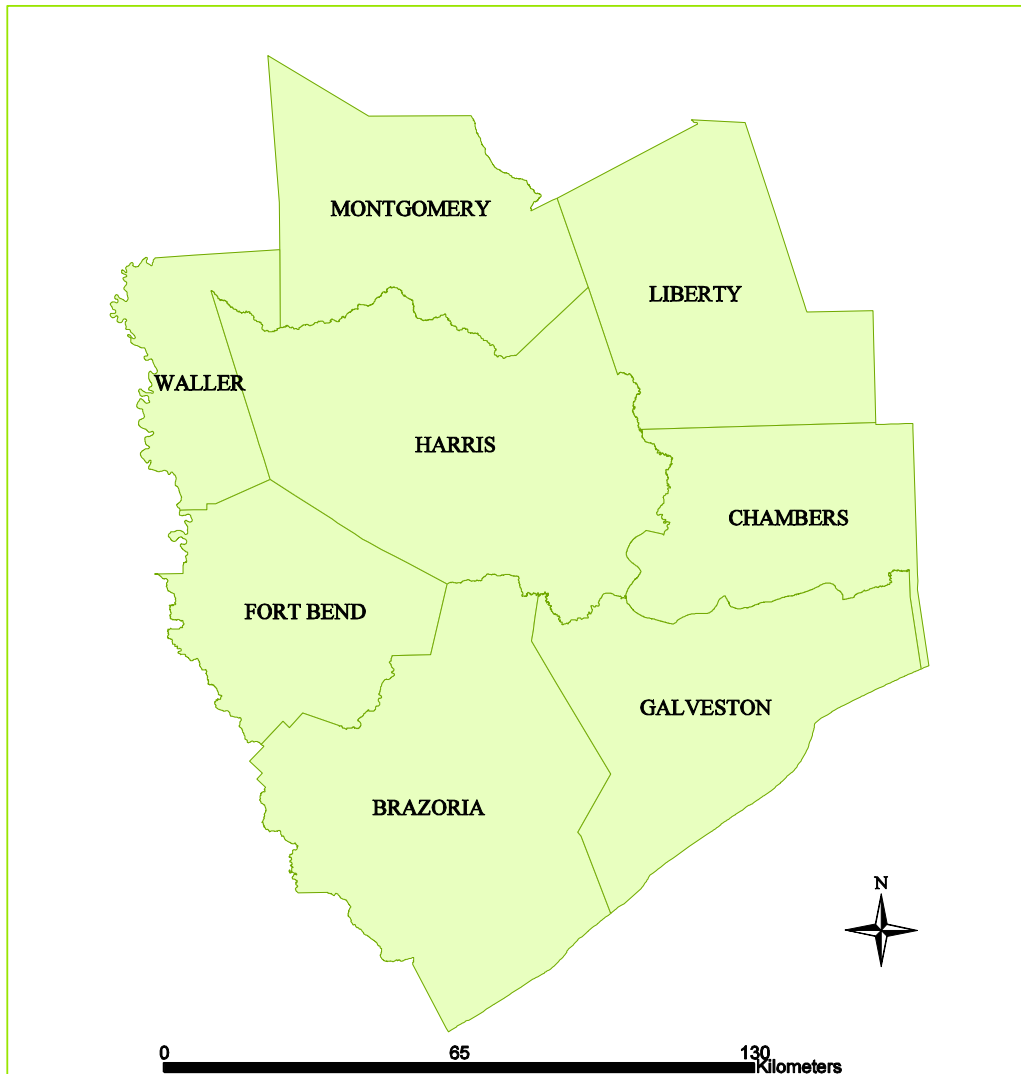


Fig. 1. The Houston CMSA counties



The Houston-Galveston-Brazoria Consolidated Metropolitan Statistical Area (Houston CMSA) forms the basic areal unit of this study. The Houston CMSA (see Fig. 1) contains eight counties and three Primary Metropolitan Statistical Areas (PMSAs): The Houston PMSA encompasses Chambers, Fort Bend, Harris, Liberty, Montgomery, and Waller Counties while the much smaller Galveston-Texas City PMSA and Brazoria PMSA each comprise a single county, Galveston and Brazoria, respectively. The Houston CMSA's population of 4.8 million is the 10th largest among U.S. metropolitan statistical areas. The city of Houston has a population of 1.9 million and is the 4th most populous city in the nation trailing only New York, Los Angeles, and Chicago.

The City of Houston lies in three counties: Harris (1,511.13 km²), Fort Bend (20.92 km²), and Montgomery (6.73 km²) (see Table 1). Under Texas' Municipal Annexation Act of 1963, the city of Houston (as can all cities over 100,000) also can exert certain powers over unincorporated areas lying within 8 km of any point on the city limits, which is termed the Extraterritorial Jurisdiction (ETJ). Houston's ETJ encompasses 3,397.93 km², excluding the area of cities that lie within it. In addition to Houston, Harris County contains part or all of 35 individual incorporated areas which lie outside of Houston's ETJ.

NAME	AREA (km ²)
Houston CMSA	22,736
Houston PMSA	16,328
Brazoria PMSA	4,138
Galveston PMSA	2,270
Harris County	4,605
Chambers County	1,551
Fort Bend County	2,266
Liberty County	3,004
Montgomery County	2,704
Waller County	1,335
City of Houston	1,539

Table 1 :Spatial extent of Metropolitan Statistical Areas and counties and the City of Houston

The City of Houston was founded in 1836 and incorporated in 1837, but grew slowly prior to 1900 when it reached a population of only 45,000. The Galveston Hurricane of 1900 and the discovery of large oil reserves at Spindletop in 1901, 145 kilometers east of Houston, led to Houston's rapid growth. Transportation improvements in the 19th and 20th centuries including the creation of the Houston Ship Channel which enabled oceangoing vessels to reach Houston itself also fueled Houston's growth. In the 20th century, federal and state intervention in the Houston economy expanded to include the funding of petrochemical plants, gas pipelines, refineries, and research and development in the petrochemical industry. The decision to locate the National Aeronautics and Space Administration (NASA) complex was another boost to the Houston area in the 1960s. Vojnovic (2003) provides a good review of the factors fueling Houston's growth.



3. Population Growth and Urbanization

Globally, the world's population is becoming more urbanized. In 1995, 51 percent of the world's population lived in settlements of at least five thousand people, an increase of 29 percent from 1950 (Clarke & Gaydos 1998). It is expected that the equivalent of 1,000 cities, each of three million inhabitants, will have to be constructed worldwide by the year 2040 (Binde, 1998). According to U.S. Census Bureau projections (U.S. Census Bureau 2000b), which rely on assumptions about future fertility, mortality, and international migration rates, suggest a doubling of the U.S. population by 2100 to approximately 570 million people (U.S. Census Bureau 2000c). Texas's population has also increased dramatically since the 1960's, and in 2003 totaled approximately 22 million making Texas the 2nd most populous state after California (MERIC, 2003; U.S. Census Bureau, 2000a).

Detailed population predictions for the period 2000 to 2040 have been performed on a county level basis for the state of Texas by the Texas Office of the State Demographer and The Department of Rural Sociology at Texas A&M University. These projections utilize a state of the art methodology cohort-component projection technique with existing demographic patterns taken into account (Texas State Data Center, 2003). Three population projection scenarios have been developed. The population projection used here represents the one-half 1990-2000 Migration scenario which assumes that net migration will occur at a rate one-half that observed during the 1990s. These projections are those recommended for most applications (Texas State Data Center, 2003). Table 2 below illustrates the population projections from 2005 to 2030 for each Houston CMSA county, Houston CMSA, and Houston PMSA (Texas State Data Center, 2003).

	2005	2010	2015	2020	2025	2030
Brazoria	263,631	285,850	308,656	331,731	354,258	375,664
Chamber	28,637	31,375	34,261	37,328	40,256	42,867
Fort Bend	401,710	449,811	501,218	557,407	615,222	670,032
Galveston	259,872	268,714	277,238	284,731	290,522	294,218
Harris	3,674,011	3,951,682	4,240,026	4,541,661	4,853,680	5,17,4691
Liberty	75,876	81,930	88,354	94,898	10,1220	107,335
Montgomery	335,176	379,363	426,858	478,187	531,570	585,111
Waller	36,644	41,137	46,142	51,175	56,654	62,352
Houston PSMA	4,552,054	4,935,298	5,336,859	5,760,656	6,198,602	6,642,388
Houston CMSA	5,075,557	5,489,862	5,922,753	6,377,118	6,843,382	7,312,270

Table 2 : Population projections from 2005 to 2030 for the Houston CMSA counties



Fig. 2 illustrates population projections for counties in the study area, excluding Harris for the 2005 - 2030 period. Fort Bend and Montgomery counties have the highest population among the seven counties and also they are projected to have the highest growth rate between 2005 and 2030. Chambers, Waller, and Liberty counties have low population amount and also have low growth rate relative to Fort Bend and Montgomery. Galveston also shows a trend close to send group, Chambers-Waller-Liberty, based on a lower growth rate especially after 2015.

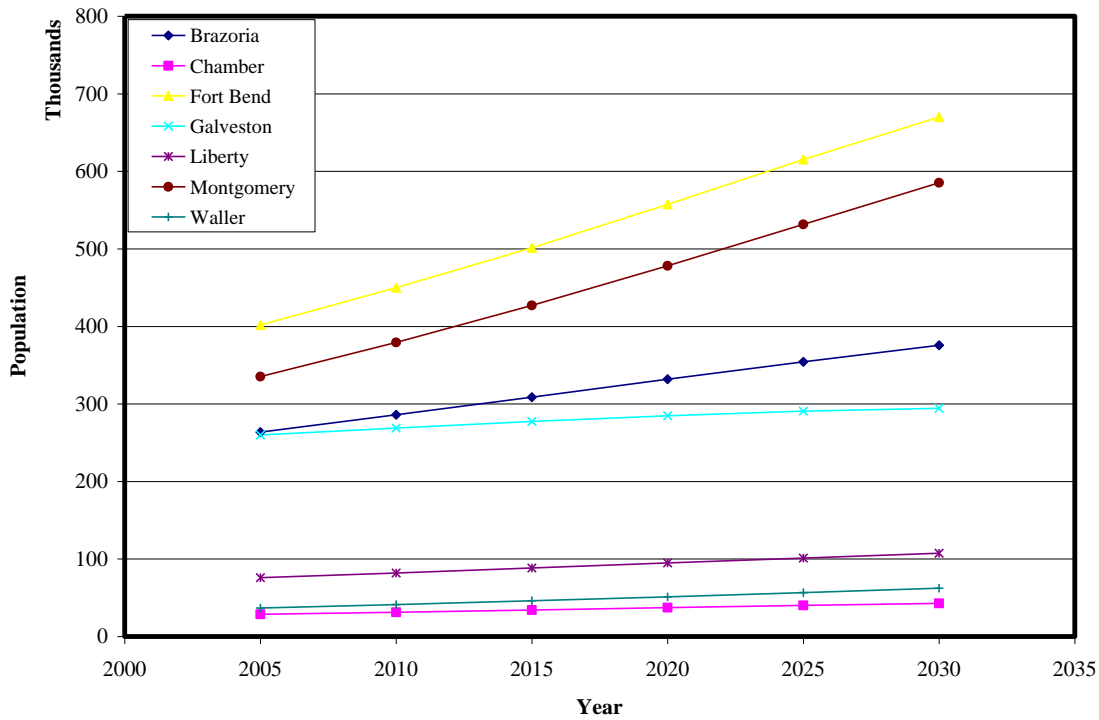


Fig. 2 Population projections for counties in the study area, excluding Harris, for the 2005-2030 period

Fig. 3 plots population growth for Harris county, Houston PMSA and Houston CMSA. Houston PMSA and Houston CMSA are similar in terms of their growth rate. This indicates that population is concentrated on Houston PMSA. Harris, Fort bend, and Montgomery counties have the highest population growth rate and population amount. Therefore, Houston PMSA shows parallel growth rate to Houston CMSA. The rest of the counties; such as Galveston, Waller, and Liberty; do not account much for the study area in terms of population growth and growth rate.

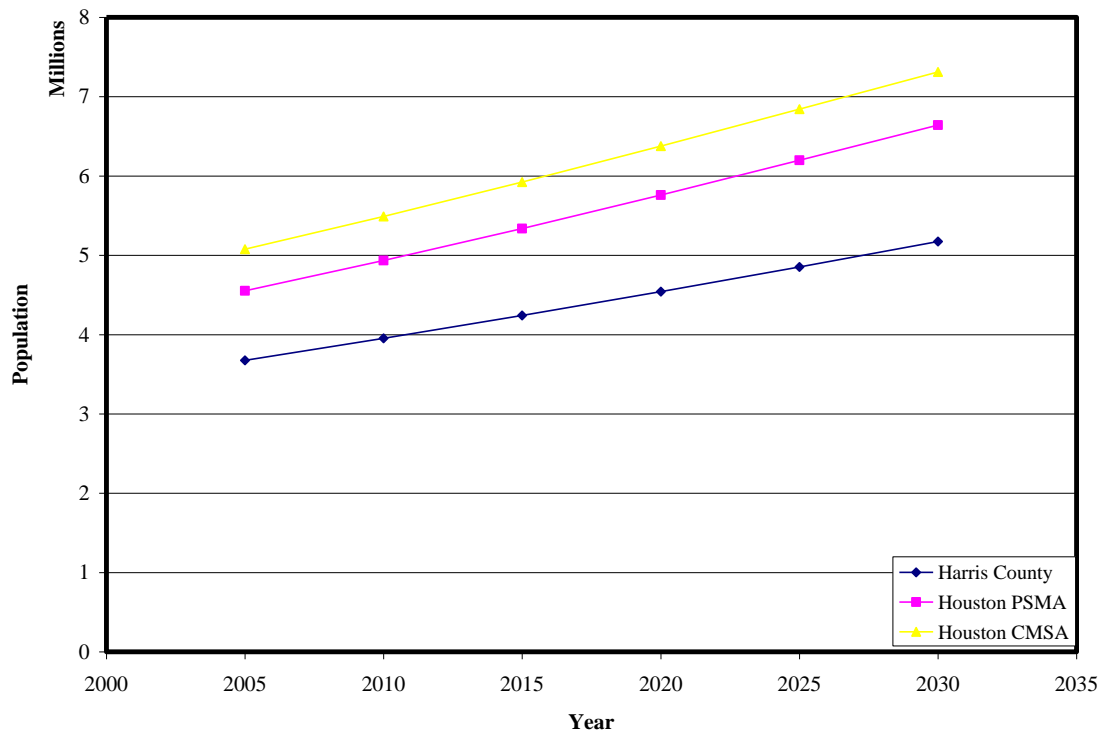


Fig. 3 Population projections for Harris County and the Houston Primary (PMSA) and Consolidated (CMSA) Metropolitan Statistical Areas for the 2005-2030 period

Population dynamics are important because land is required to accommodate the world's rapidly increasing urban population. In Texas, the major urban growth form is sprawl, occurring as a result of a surging state population.. Urban sprawl such as has occurred in Houston is characterized by (1) low density development that extends outward from city centers, (2) a heavy dependence on automobiles for transportation and (3) single-use zoning that separates one type of land use from another (EPA, 2000). As a result of urban sprawl, farmland and natural habitats are being replaced with low density single family dwellings and sprawling retail shopping complexes, deteriorating the environment and outpacing the economic benefits of growth. As outlying growth centers continue to develop, such as Houston's edge cities (Garreau, 1991) of the Galleria and Greenspoint, people and businesses then begin to move away from the central city, which can lead to urban decay and the isolation of disadvantaged populations (EPA, 2000).



4. Urbanization and Modeling

Urban modeling is generally concerned with designing, building and operating mathematical models of urban phenomena, typically for cities and regions to help scientists understand urban phenomena through analysis and experiment and aid planners politicians and the community to predict, prescribe and invent the urban future (Batty, 1976). The role of models in the planning process is to help understand the behavior of urban systems. Hester (1970) identifies two objectives for the use of models in urban planning. One is to uncover the dynamics of urban development, as a means of advancing the theory of urban growth, and making theory operational so that it can be refined and tested. The second objective for the use of models in urban planning is to provide a method for projecting the future state of the systems they describe, in order to anticipate or influence the course of urban development in accordance with public policy.

According to Guhathakurta (1999), the renewed optimism of large-scale urban models stems from two sources: (1) the power of personal computers and (2) the promise of geographical information systems (GIS) as a communicative platform for testing and applying urban models. This new technology must be integrated with a new planning philosophy. Guhathakurta (1999) argues that it is essential to forge a symbiotic relationship between planning theory and the urban modeling efforts and the validity of urban modeling can be demonstrated through successful use by the planning community. The role of models in the planning process has increased in relation to their greater acceptance in the planning community.

5. Urban Models

Modeling has been used to study the demographics, economic activity and spatial organization of urban areas using both descriptive and predictive approaches. Computer models used in community planning traditionally have focused on regional economic trends or transportation related impacts on economic growth (EPA, 2000). Demographic models are used for the analysis and projection of population dynamics and are useful for planning purposed because they can examine the effect of population growth on land requirements for housing and other urban activities and the influence of population growth on investment decisions and on public policy (Masser, 1972; Oppenheim, 1980). Economic activity models (i.e. inter-industry relationships, economic base, input-output analysis) are techniques for analyzing economic activity in relation to urban planning and can aid in the formulation of planning policies and provide insights into the structure of the local economy (Masser, 1972). Finally, spatial organization models such as gravity models, the Lowry model, and operational urban models, attempt to explain the spatial organization of population and economic activity within regions and urban areas.



Since all urban activities influence one another, a model that considers the spatial relationships represents an improvement in modeling urban growth. Gravity models have long been used for analyzing spatial relationships in regions and urban areas more than any other form of mathematical model (Lee, 1973; Masser, 1972). Gravity models analyze the interaction between various urban activities, and are so called because the gravity concept of human interaction is based on the Newtonian concept of gravity (Lee, 1973). Main urban modeling, the gravitational pull exerted by two bodies is interpreted as the amount of interaction between two areas, and the mass of the bodies is measured in terms of size and attractiveness of the urban areas (Lee, 1973). Even though gravity models have been widely within the planning community, they have problems and limitations. The main criticism is the lack of a sound theoretical base. Lee (1973) states that gravity models are not based on any theory of urban system behavior and lack explanatory behavior. Gravity models may describe the interaction between activity centers; however, they fail to explain the interactions.

One of the most widely applied urban models is the Lowry model which depicts well the relationships between transportation and land use. The core assumption of the Lowry model assumes that regional and urban growth (or decline) is a function of the expansion (or contraction) of the basic sector. This employment is in turn having impacts on the employment of two other sectors, retail and residential. The Lowry model introduced two major innovations into the urban modeling field: (1) it incorporated within its structure both a forecasting land use distribution and intensity of land use activities and (2) it related three elements of the urban system (population, employment and transportation) within one model framework (Lee, 1973). According to economic base theory, the major force driving changes in the structure of an urban region is employment change in the region's industries, and this affects population and employment levels directly and indirectly (Lee, 1973). The model has been widely applied and has proved useful in a variety of studies, but it also has been criticized because it is a static model (Lee, 1973).

Recently there has been renewed interest in the development of operational urban models to aid in understanding the adverse effects of urban expansion. This renewed interest in urban models stems from a increases in computer computational power, software developments such as Geographic Information Systems (GIS), plentiful digital data and increasing environmental concerns. The emphasis on "smart growth" which attempts to balance the needs for development with quality of life has put an increasing emphasis on spatially explicit models that address the environmental consequences of land use/land cover (LULC) change. "Smart growth" places emphasis on town-centered development, mass transit and pedestrian oriented planning, and seeks to achieve a balanced mix of housing, commercial and retail uses (EPA 2000). Operational urban models can be applied at multiple locations and generate results that address relevant planning issues. Table 3 summarizes the type of operational urban models currently available (Klosterman 2000) where "model type" refers to aspects of the models such as operational method, underlying math structure and thematic scope. Although a number of urban models have been developed, only a few are actually available, and even fewer are freely available. The LUCAS, Markov, SLEUTH, Smart Growth Index, UPLAN, and UrbanSim are the only free models available for academic research.



Model	Spatial Interaction	GIS Requirements	(Planning)	GIS (Calibration)	Other
Community Viz		X			
CUF, I		X			
CUF, II				X	
CURBA				X	
DELTA					X
DRAM/EMPAL	X				
GSM		X			
INDEX		X			
IRPUD	X				
LTM					X
LUCAS				X	
Markov					X
MEPLAN	X				
METROSIM	X				
SAM-IM		X			
SLEUTH					X
Smart Growth Index		X			
Smart Places		X			
TRANUS	X				
Ugrow					X
UPLAN		X			
UrbanSim	X				
What if?		X			

Table 3: Type of operational urban models

6. Complexity of Urban Environments

Urban areas have complex land use patterns. This complexity is meaningful as it represents the information-rich nature of the system, and is necessary for the successful functioning of the city (White et al. 1997). Work by White and Engelen (1993) on the theory of dynamics and evolutionary systems provides support for the idea that complexity is an inherent and necessary characteristic of cities. These complex urban patterns can be captured by a GIS for use in models. The integration of Cellular Automata (CA) with GIS provides an approach to modeling spatial dynamics that both retains and utilizes the spatial complexity of cities (White et al. 1997). Clarke and Gaydos (1998) believe CA models are ideally suited to modeling urban systems, because of more unknown than measurable variables. The number of variables involved in the urban growth process has not been concretely established. The SLEUTH model attempts to simplify the process by modeling the complex nature of urban areas solely by the physical controls to development.



7. Limitations of Modeling in GIS

GIS requires improvement and advancement of analytical capabilities. Solutions are required for problems that address both the performance and the modeling problems of contemporary GIS (Wagner, 1997). Contemporary GIS has serious deficiencies as a platform for urban modeling including poor performance for many operations (especially for large data volumes), poor ability to handle dynamic spatial models, and poor handling of the temporal dimension (Park & Wagner, 1997). Research has focused on improving the analytical capabilities of spatial modeling within GIS (Park & Wagner 1997; Fotheringham & Rogerson, 1994; Semboloni, 1997). In these efforts the focus is on the incorporation existing spatial models into GIS and to a lesser extent the development of a more suitable GIS-based framework for spatial modeling (Wagner 1997).

Sui (1998) claims that the integration of urban modeling with GIS must proceed with the development of new models for inherently complex cities, the incorporation of multi-dimensional concepts of space and time with GIS, and through extension of the feature-based model to implement these new urban models and spatial-temporal concepts. One means to overcome the performance constraints of current generation of GIS for urban modeling is through the use of cellular automata (CA).

The integration of CA and GIS is not only feasible, but provides many advantages. Cecchini (1996) concluded that CA and other techniques from within the artificial intelligence paradigm are useful for representing socioeconomic and urban development phenomena which are shaped by individual choices and decisions. Current research on coupling CA with GIS has improved the analytical capabilities for dynamic spatial modeling (Wagner, 1997; Park & Wagner, 1997; Clarke & Gaydos, 1998). Park and Wagner (1997) have shown significant advantages of CA in data analysis and modeling. The abilities of CA to perform spatial dynamic modeling, to handle time explicitly, and the ease with which CA models can be constructed are all valuable benefits (Wagner, 1997). Couclelis (1997) argues that the integration with GIS has helped move cellular automata-based urban and regional models from the realm of instructive metaphors to that of potentially useful quantitative forecasting tools.

8. Cellular Automata

CA belongs to a family of discrete, connectionist techniques that are currently being used to investigate fundamental principles of dynamics, evolution, and self-organization (White & Engelen, 1993). Essentially, a cellular automaton model is composed of a finite set of grid cells, the current state of each cells, a set of transition rules for the cells, and the neighborhood of a cell. In a strict cellular automaton the rules must be uniform and must apply to every cell, state, and neighborhood. Every change in state must be local implying that there is no action at a distance (Batty et al., 1997). There are many renditions of CA, but the current ones that have applicability to urban systems follow Conway's logic.



9. Urban Modeling Using CA

The application of CA to dynamically model urban systems can be traced back to CA's beginnings. The first attempts to build mathematical CA models of urban systems originated with Hagerstrand's (1967) spatial diffusion models. This was followed with work accomplished by Tobler (1970) formulating a demographic model based on the cell-space concept in the Detroit region. Tobler (1979) continued his pioneering efforts by formulating models for geographic problems following strict CA principles. Couclelis (1985, 1989, and 1997) followed using CA to explore theoretical issues such as complexity and structure formation of urban systems.

A number of studies applied CA to practical problems in urban modeling and land use planning starting in the early 1990s. White and Engelen (1993) used a cellular modeling approach to investigate the dynamics, evolution, and self-organization of urban land use patterns. Batty and Xie (1994) formulated a CA model to simulate historical development in Savannah, Georgia and this was followed by Batty et al. (1997) who established a generic framework for urban simulation using CA. Cecchini (1996) implemented an urban modeling scheme through a system called urban automata, conceptually developed by the CAVE (Cellular Automata in Venice) research group. White et al. (1997) developed a cellular automaton model that generated a spatially detailed representation of the evolution of urban land use patterns. Semboloni (1997) developed an urban and regional model based on CA and economic theory, structure and policy parameters, and population. Wu (1998) developed a fuzzy-logic-controlled CA to simulate urban encroachment on rural land in the context of sustainable development. Webster and Wu (1999) used cellular automata simulations to explore the impact of alternative systems of pollution property rights on urban morphology and performance. More recently, Li and Yeh (2000) attempted to model sustainable urban development with a cellular automaton model and GIS.

The basis of the SLEUTH CA model used in this research had traces its heritage to Clarke et al. (1997) who used a self-modifying cellular automaton to model historical development in the San Francisco Bay area. This initial work was followed by Clarke and Gaydos (1998) who applied the same model to the Washington-Baltimore corridor in the Eastern United States. This research by Clarke et al. (1997) and Clarke and Gaydos (1998) demonstrated that urban growth in these two quite different regions could be successfully predicted using loose-coupling of a cellular automaton model in concert with GIS. The developed model is scale independent, which allows local, regional, and continental scale processes to be described in a single context. The model functions similarly to the way in which a city expands; i.e. every single part acts as part of an ensemble to collectively urbanize a region. The complex aggregate behavior of CA modeling results from many interacting self-motivated agents, which has great value for both urban modeling and for the data rich environment of GIS (Clarke & Gaydos 1998).



The theoretical advance of the represented by this model is its incorporation of self-modifying rules. The control parameters of the model are allowed to self-modify; that is, the CA adapts itself to the circumstances it generates (Clarke et al. 1997). The self-modification rules account for periods of rapid growth or economic stagnation. As time progresses, the factors controlling real-world urbanization change and this is represented by the model's self-modifying rules. Without these rules, the model produces linear or exponential growth as long as new land remains available for urbanization. Self-modification generates the typical S-curve growth rate (see Fig. 4) of urban expansion observed within a region (Clarke & Gaydos, 1998). Clarke and Gaydos (1998) identify the need for the model to be ported to, and repeatedly applied to, new study areas and at different map scales. Applying the model to different study areas will test the reliability and applicability of the model.

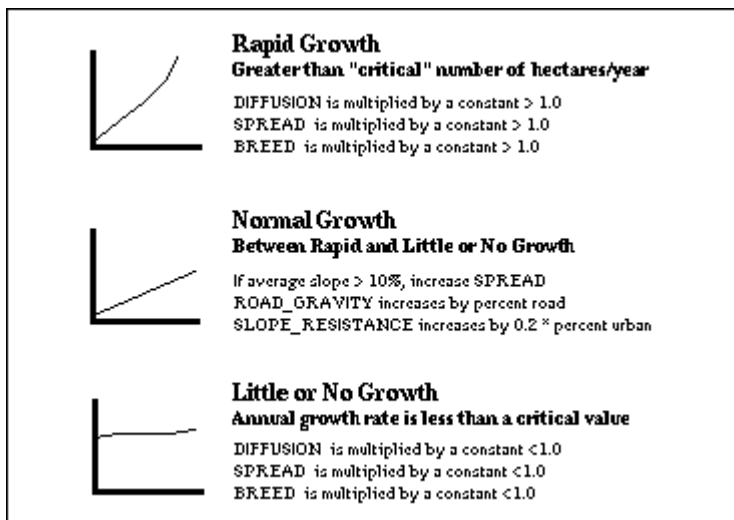


Fig. 4 Growth patterns under the self-modification rules (Gigalopolis website, <http://www.ncgia.ucsb.edu/projects/gig/>)

10. Materials and Methods

10.1. The Basics of the SLEUTH Model

The SLEUTH model, formerly known as the Clarke Cellular Automaton Urban Growth Model (Clarke & Gaydos, 1998; Clarke et al., 1997) is a CA model written in the C programming language and selected for predicting urban growth in the Houston CMSA. SLEUTH is an acronym created from its six required input layers: Slope, Land Use, Exclusion, Urban, Transportation, and Hillshade. SLEUTH is a self-modifying cellular automaton model whose control parameters change when modeled growth rates exceed or fall below critical threshold values (Clarke et al., 1997). In SLEUTH, self-modification is equivalent to adaptation or evolution, and the calibration method enables the model to "learn" its local setting over time (Clarke et al., 1996).



Urban expansion in SLEUTH is modeled on a two-dimensional grid. SLEUTH's sets of predefined growth rules are applied in a set of nested loops. The outer control loop executes each growth "history," of the two-dimensional grid and retains cumulative statistical data, while the inner loop executes the growth rules for a single "year." The growth rules are applied on a cell-by-cell basis and the array is synchronously updated at the end of each year in the simulation. The modified array forms the basis for urban growth in the succeeding year. Potential cells for urbanization are selected at random and the growth rules evaluate the properties of the cell and its 8 successive neighbors such as whether or not they are already urbanized, what their topographic slope is, and their proximity to a road.

Four types of urban growth are possible in the model: 1) spontaneous, 2) new spreading center (diffusive), 3) organic (edge), and 4) road influenced growth (Table 4). Spontaneous growth occurs when a randomly chosen cell falls adjacent to an already urbanized cell. It simulates the influence urban areas have on their surroundings. New spreading center growth permits the urbanization of cells which are flat enough to be desirable locations for development, even if they are not located adjacent established urban cells. Organic growth spreads outward from existing urban centers and represents the tendency of cities to expand. Road influenced growth encourages urbanized cells to develop along the road network.

SLEUTH GROWTH TYPES	DEFINITION OF GROWTH TYPES
Spontaneous Growth	Simulates the random urbanization of land
New Spreading Centers	Simulates the development of new urban areas
Edge (Organic) Growth	Stems from existing urban centers
Road-Influenced Growth	Simulates the influence of the transportation network on development pattern

Table 4: SLEUTH growth types

Five coefficients control the behavior of the cellular automaton, 1) the diffusion coefficient determines the overall outward dispersiveness of the distribution; 2) the breed coefficient specifies how likely a newly generated detached settlement is to begin its own growth cycle; 3) the spread coefficient controls how much organic expansion occurs from existing settlements; 4) the slope resistance coefficient influences the likelihood of settlement exceeding up steeper slopes; and 5) the road gravity coefficient attracts new settlements toward and along roads.



SLEUTH's second level growth rules are its self-modification rules which are prompted when growth rates exceeds critical high values or critical low value. Crossing a critical high or low threshold, defined by the model will initiate an increase or decrease in diffusion, breed, and spread coefficients. An increase in the diffusion, breed, and spread coefficients represents the tendency of an expanding urban system to grow even more rapidly while a decrease represents declining growth in a depressed or saturated urban system. The self-modification rules also affect the road gravity coefficient and the slope resistance coefficient. The road gravity coefficient is increased as the road network enlarges which represents increased accessibility to the area. As the amount of land available for development decreases as urbanization progresses, the slope resistance coefficient will decrease as well allowing expansion to encroach upon steeper slopes which are less desirable for urbanization. Typically under SLEUTH's self-modification rules, the coefficient values increase most rapidly in the beginning of a growth cycle, when many cells are open for urbanization, and decrease as urban density increases in the region and expansion declines (Clarke & Gaydos 1998).

10.2. SLEUTH Inputs

SLEUTH is a scale independent model and can be used to model the spatial patterns of urban growth at a variety of spatial scales in different regions. Successful initialization of SLEUTH for the eight-county Houston CMSA requires five input layers: urban extent, transportation, areas to be excluded from urbanization (e.g., water bodies), slope and a hillshade image (for visualization only). For statistical purposes, model requires at least four urban extent layers. It also requires at least two transportation layers of different years, a single layer of slope, one layer with areas excluded from urbanization and a hillshade layer for use only as a background with the graphical version of the model (Gigalopolis, 2003).

The development of the required thematic information for calibrating the growth coefficients for the Houston CMSA based on observed urban growth during the 1974-2002 calibration period and for predicting urban growth in the Houston CMSA over the 2002-2030 prediction period is described in detail in Chapter II. A summary table of the SLEUTH inputs is described in Table 5.

SLEUTH INPUT DATASET						
# of Layers	Layer Type	Years				
4	Urban	2002	1992	1984	1974	
2	Lulc	2002	1992			
5	Road	2025	2002	1990	1984	1974
1	Excluded					
1	Slope					
1	Hillshade					

Table 5: SLEUTH input dataset

The SLEUTH model domain for the eight county Houston CMSA study area (which is approximately 22,736 km².) was 1843 pixels east-west and 2100 pixels north-south. The spatial resolution of each grid cell in the model domain was 100 m x 100 m.



10.3. SLEUTH Calibration Results

In chapter II, we have successfully calibrated the SLEUTH model using historical urban extent, land use, and road layers. Table 6 shows coefficient values that were obtained in calibration phase. Five coefficients that control the behavior of growth are derived after the rigorous calibration process. These coefficient values are used in prediction mode in the model to predict urban growth till 2030 for the study area, Houston CMSA.

Year	Diffusion	Breed	Spread	Slope resistance	Road gravity
1984	1	2	84	36	15
1992	1	2	91	31	16
2002	1	3	100	23	17

Table 6: Averaged coefficient values after the “derive forecasting coefficients phase”

The values that will be used in prediction mode are laid out in year 2002. As seen from the table above, spread coefficient is the single dominant coefficient, which states that the metropolitan area has been experiencing an “organic” growth.

11. Results

Future urban growth of the Houston CMSA is predicted from 2002 to 2030. The predicted growth is outputted individual years from 2003 to 2030. For this particular paper, predictions from only three years, 2010, 2020, and 2030 are illustrated in Figs. 5, 6, and 7 respectively.

The growth is concentrated on the urban-rural fringes and the calibration of the model helped us reach the best values. The model was accurate in modeling Houston CMSA’s organic growth and this gives extra strength to the model’s own ability to automatically calibrate itself.

Predicted population estimates (Texas State Data Center, 2003) are used to compare with urban growth predictions. The results indicate that urban growth rate is slightly higher than population rate as shown in Fig. 8.

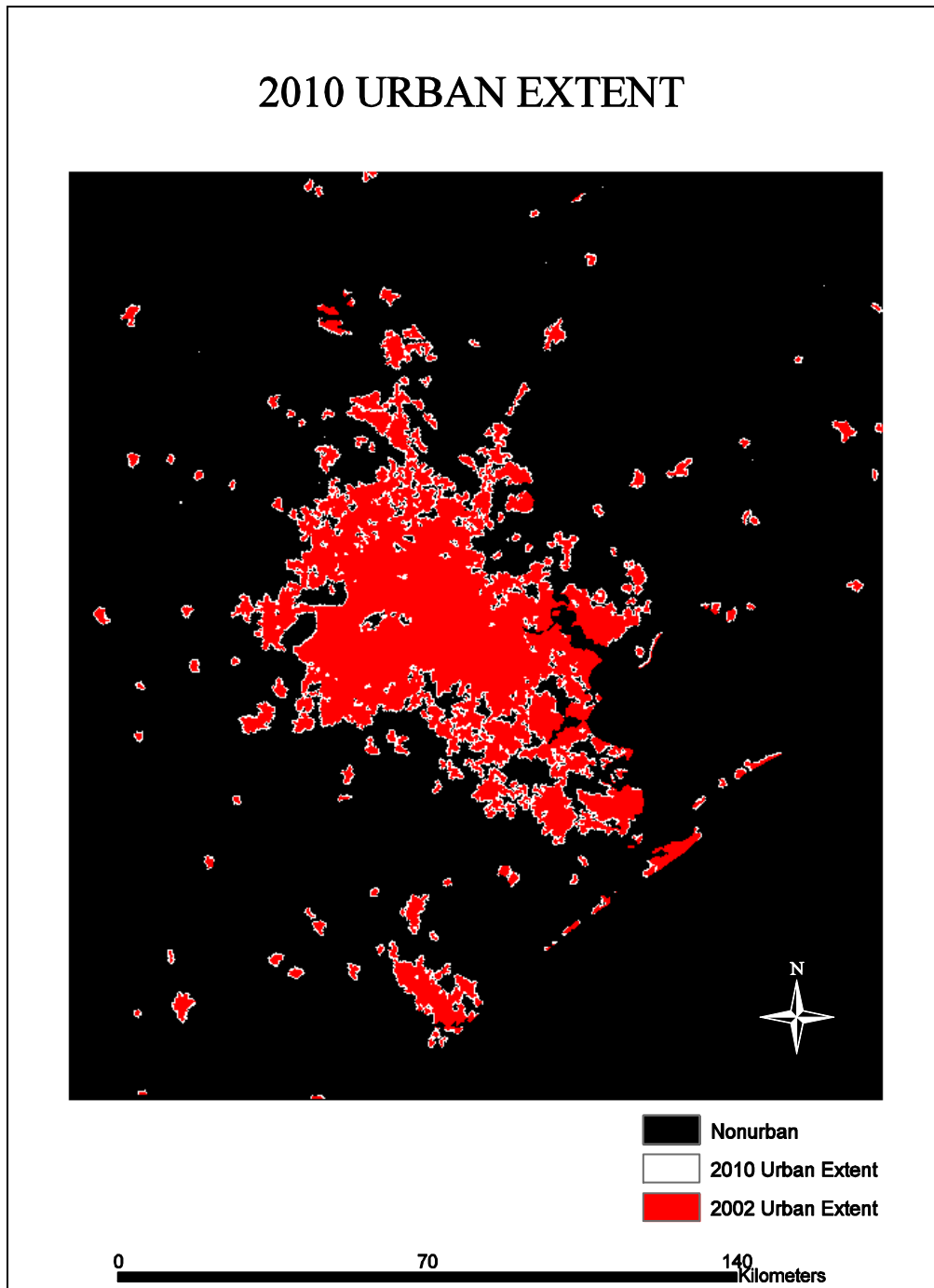


Fig. 5 Predicted urban extent in 2010 for Houston CMSA

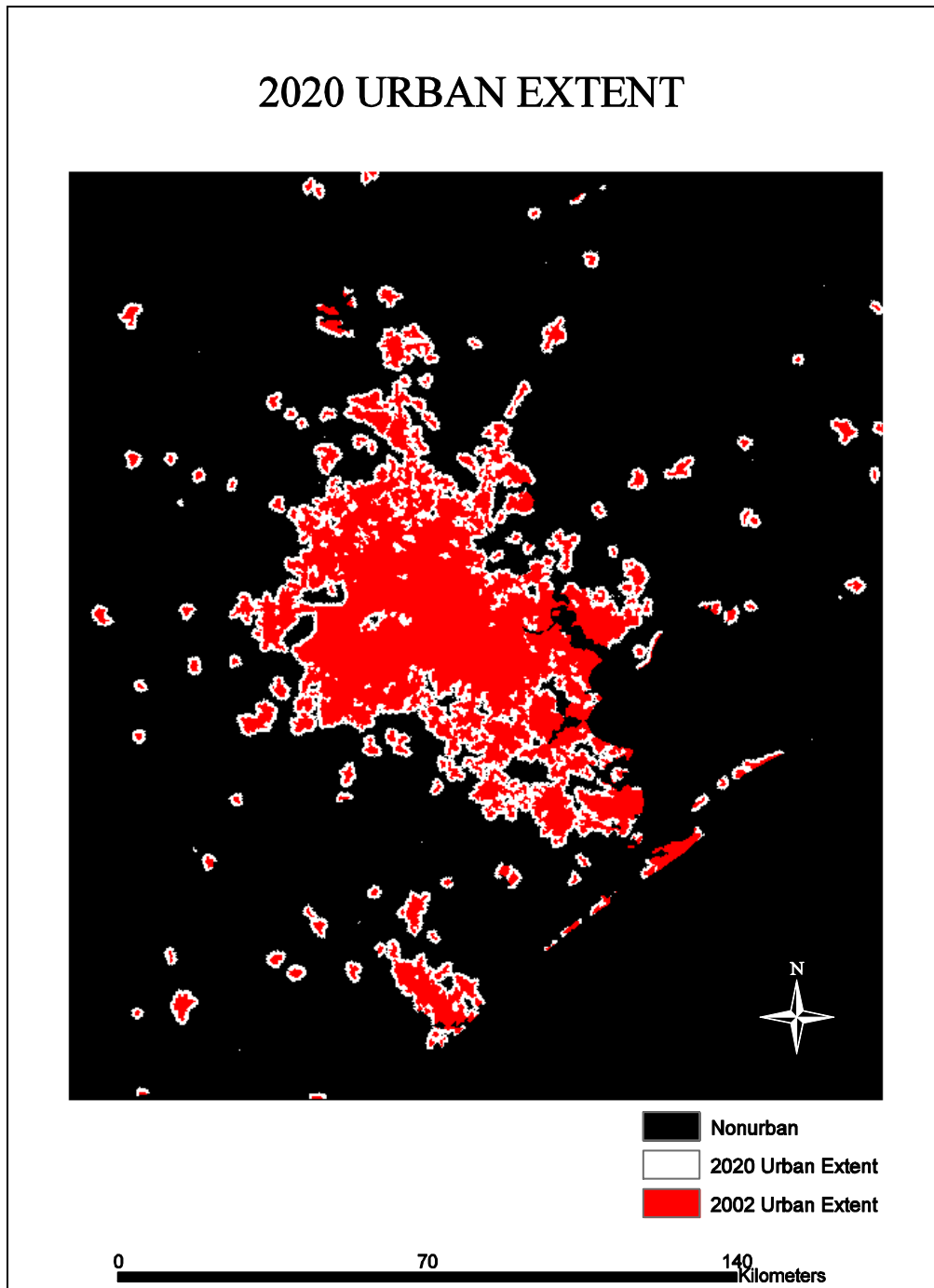


Fig. 6 Predicted urban extent in 2020 for Houston CMSA

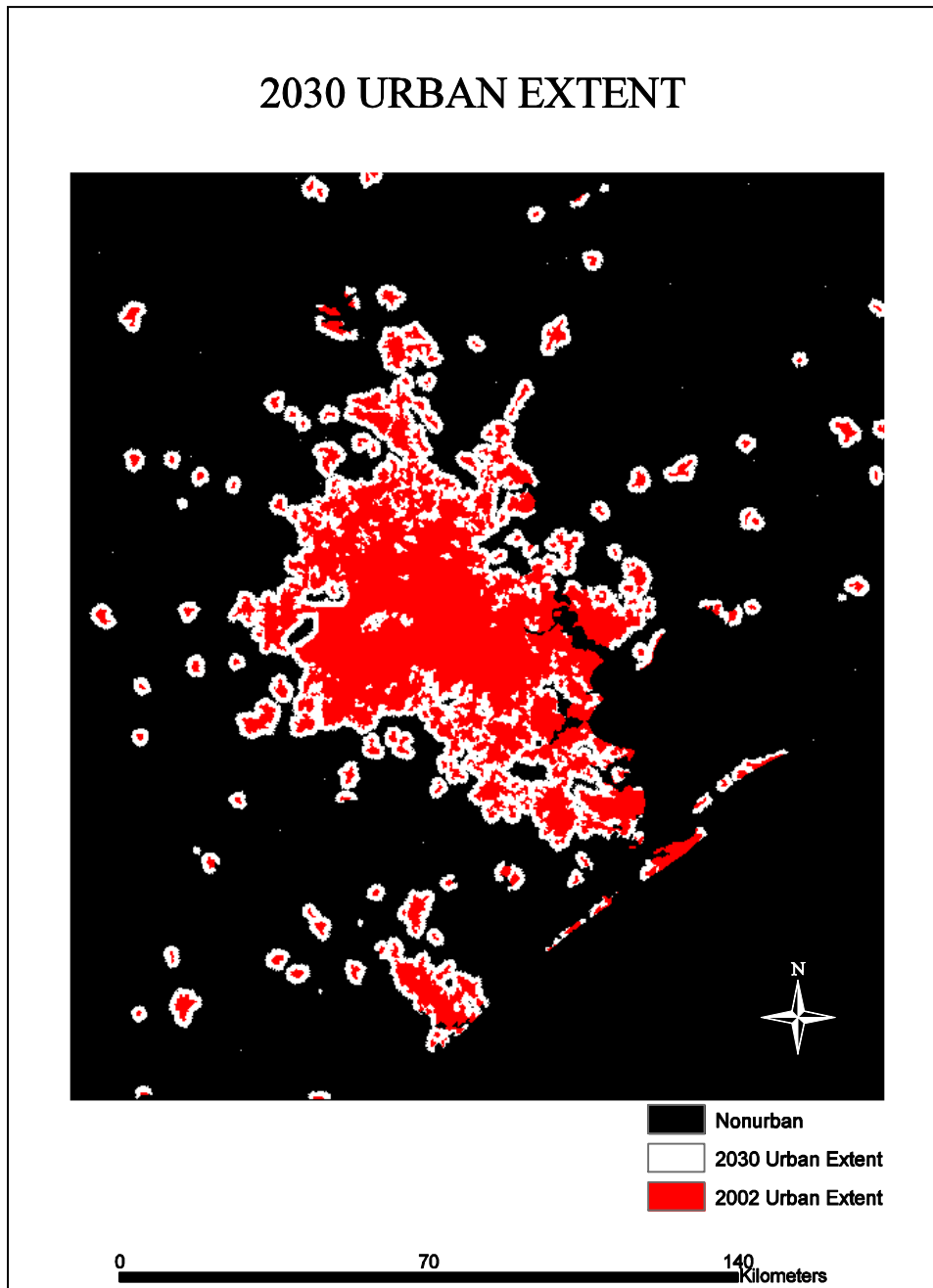


Fig. 7 Predicted urban extent in 2030 for Houston CMSA

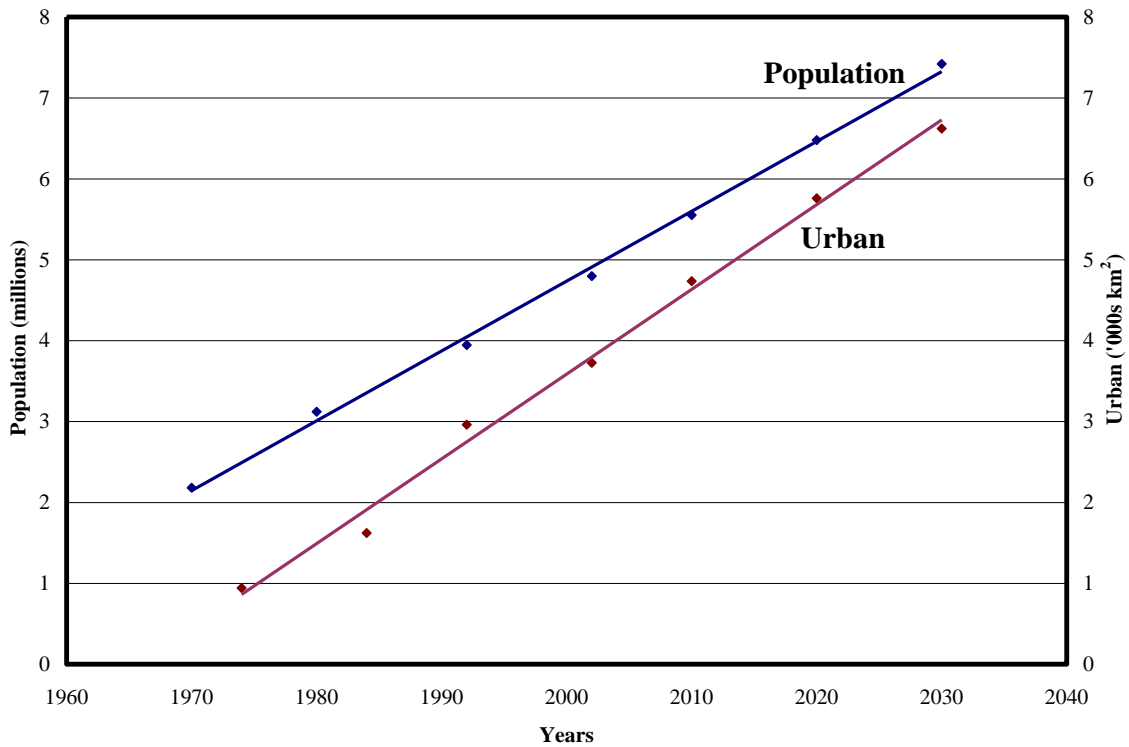


Fig. 8 Population vs. urban growth in Houston CMSA

Past and future urban growth predictions in the three PMSAs that form Houston CMSA are presented in Fig. 9. It is easy to see that major urban growth occurs in Houston PMSA rather than other two PMSAs.

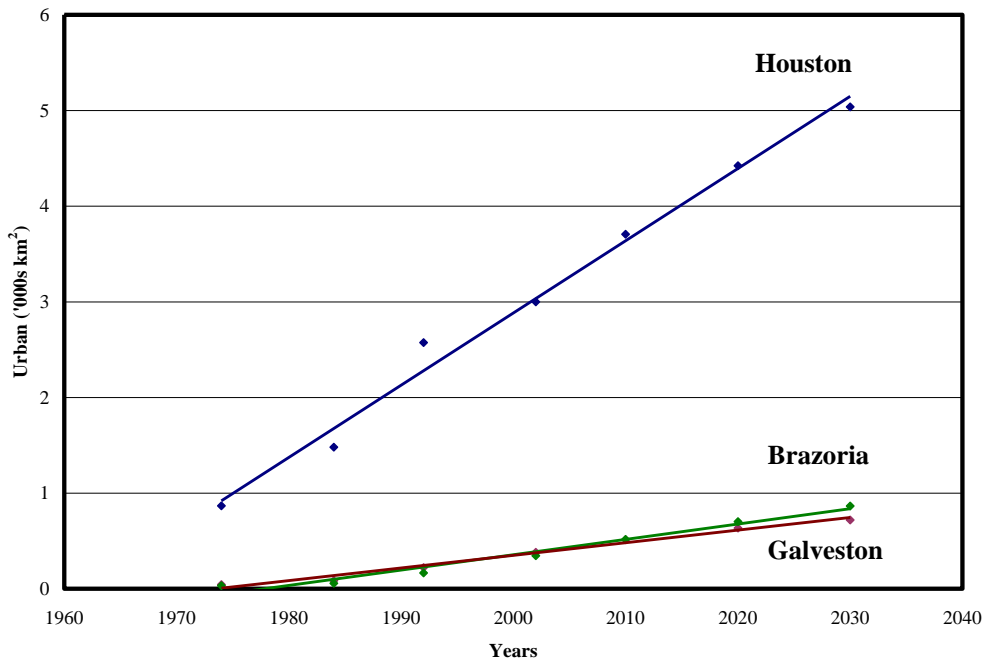


Fig. 9 Urban growth in Houston, Galveston, and Brazoria PMSAs



Urban growth by the percentage of land portion of county is a good measure to illustrate how much of the urban development account for the whole county area. Fig. 10 exhibits that Harris and Galveston counties account for most of the urban based on their county size.

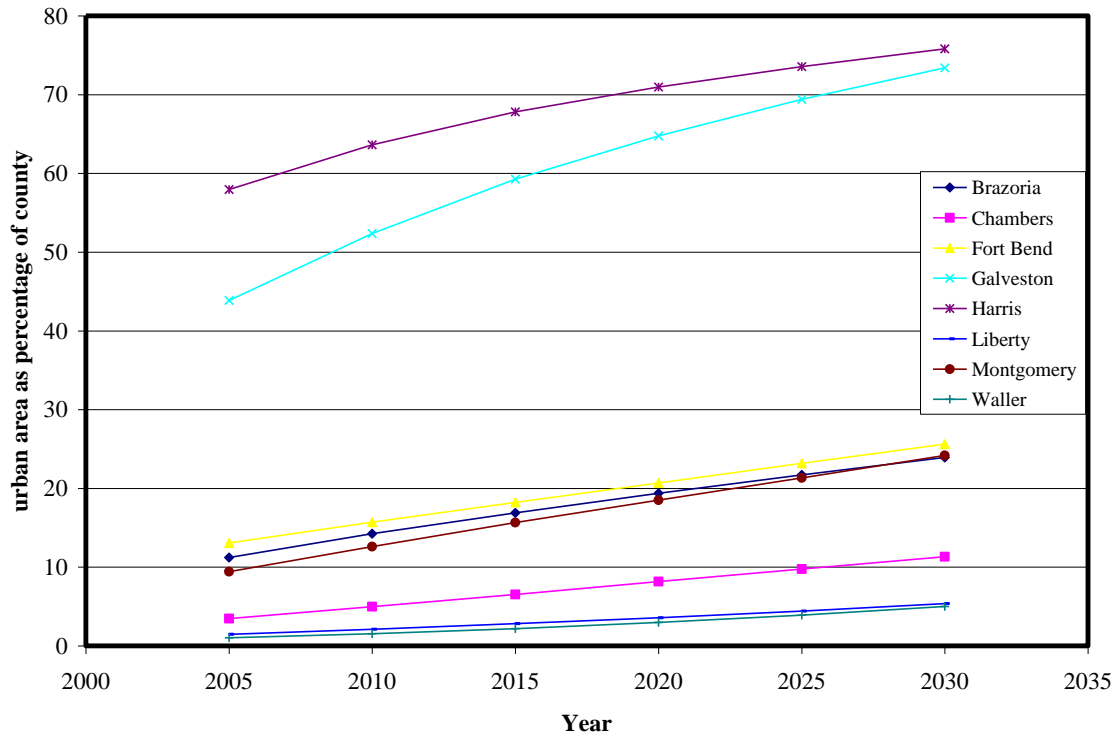


Fig. 10 Urban area growth (% of Land portion of county)

Fig. 11 depicts an interesting result, such that, Harris and Galveston counties' growth rates have been in decline more than the other counties in Houston CMSA. This could be due to following two reasons: either growth rate is declining because available land also is declining for both of the counties, Harris and Galveston (see Fig. 10); or these two counties might have implemented a smart growth policy.

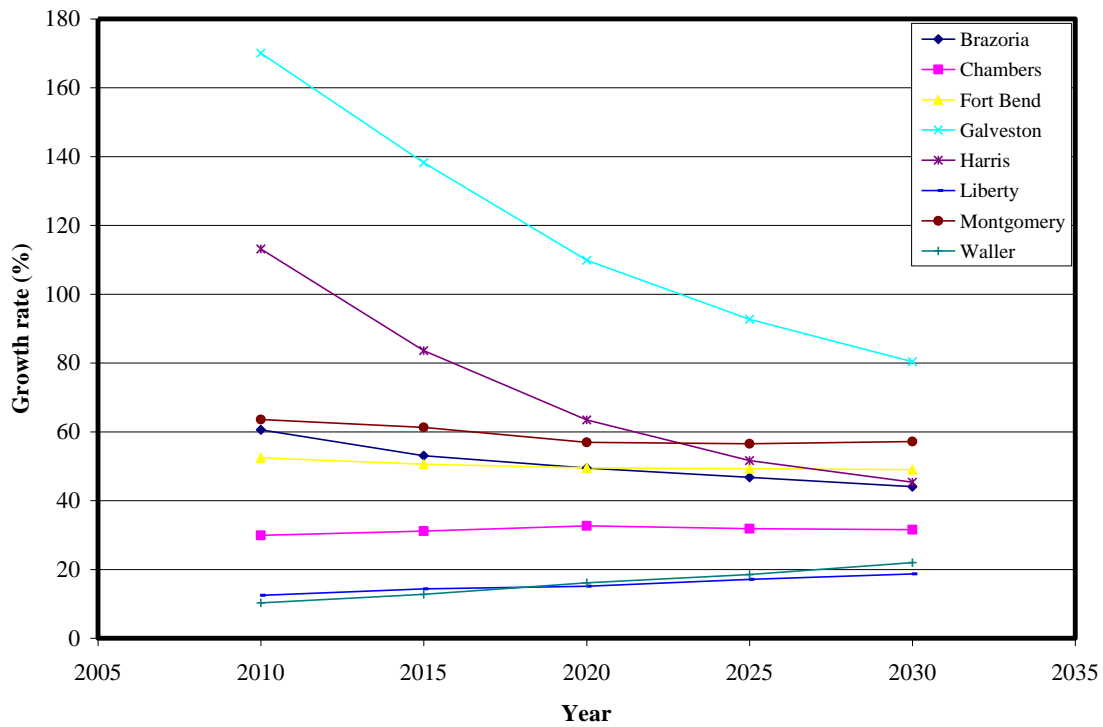


Fig. 11 Growth rates $[(\text{year2}-\text{year1})/5]$ for CMSA counties

Fig. 12 illustrates the urban growth for each county, plotted in logarithmic scale. It is clear that Harris County is the most urbanized county in our study area.

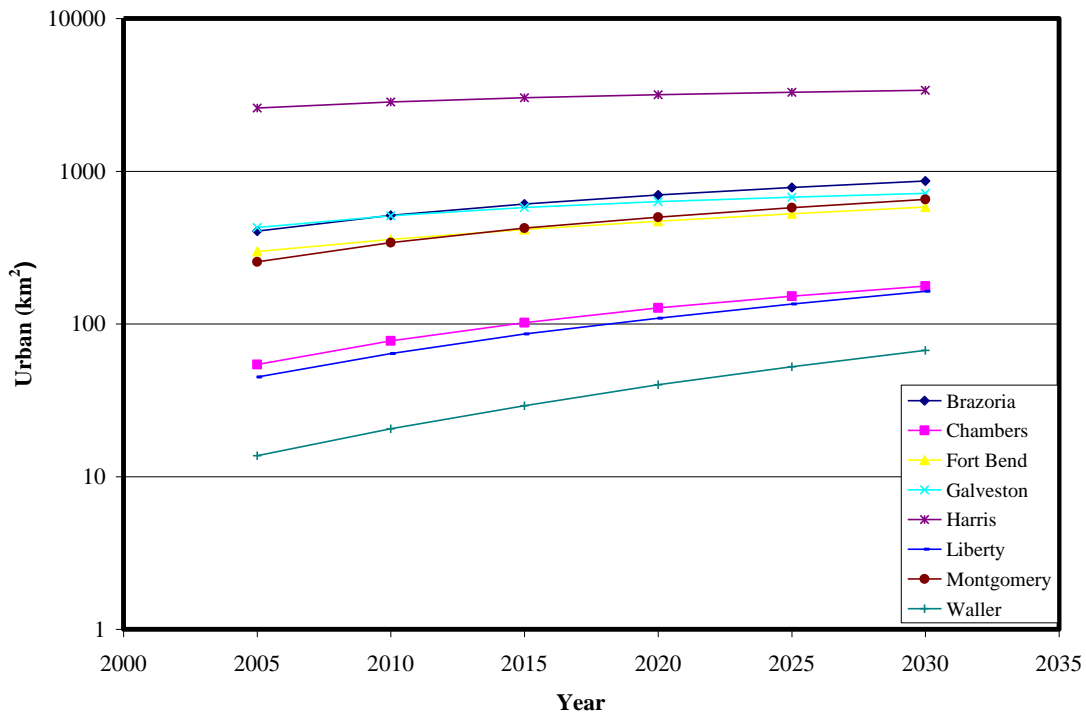


Fig. 12 Urban growth in each county (logarithmic scale)



12. Conclusions

The uniqueness of this study is twofold: first, it is the only Consolidated Metropolitan Statistical Area that is modeled for urban growth and second, it is the only metropolitan area that functions without zoning and a plan. Most increase in urban and population growth in Houston CMSA occurred between 1970s and 1990s. This trend however had slowed down in both urban and population by 2002. Results reveal that urban growth is concentrated on the urban/rural fringes in the Houston CMSA. Predicted results also indicate that urban growth for the period from 2002 to 2030 is in almost parallel with the population growth prediction.

Among Houston PMSAs, Houston was the major metropolitan area that drove the population and urban growth in Houston CMSA. Galveston and Brazoria PMSAs did not show increase in both and they reflect very small part of Houston CMSA.

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ESTABLISHING HEAVEN UPON EARTH: THE GREAT RESPONSIBILITY OF RELIGIOUS LEADERS AND MOVEMENTS

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There is no religion in the world being indifferent to nature and environmental value. Nature is a mirror into which the power of the creator is reflected. Since the religious have important influence in changing the attitudes, beliefs and lifestyle of their followers, they may lead great movements toward “environment without pollution”. At first stage all religious institution should be aware of the depth of environment pollution and the activities that can be done by them toward environment respect and conservation and at the second stage all these institution should convey the concept of “Establishing heaven upon earth” to their society.

This article will exemplify such approach by looking at

Seicho – No – lo religious movement in Japan.

Key words: *environment, religion, Seicho – No – lo religious movement*

Introduction

Human kind in his eagerness to progress and develop has lost sight of the finite and delicate nature of Planet Earth which is unique in the universe. No other planet could support life like Earth. But this glorify planet is polluted and its pollution is the most important challenge threatening the health worldwide. Human activities inflict harsh and often irreversible damage on critical resources of the earth. Indicators show that from one side renewable resources, water, forests, topsoil... are under extreme pressure under our practice, and their productivity is in decline and from the other side the rate of diseases of many kind increases. According to a WHO assessment of the burden of disease more than 13 million deaths annually are due to preventable environment causes. Nearly one third of death and disease in the least developed regions is due to environmental causes. Wise investment to create a supportive environment can be a successful strategy in improving health and achieving development that is sustainable and this requires participation all groups of society's especially religious leaders. Religions are necessary partners in the environment protection movement and in the challenges of addressing current environmental problems.

The importance of religions in society's changes

Religion is a system of social coherence based on a common group of beliefs or attitudes concerning an object, person, unseen being, or system of thoughts considered to be supernatural, sacred, divine or highest truth, and the moral codes, practices, values, institutions, and rituals associated with such belief or system of thought.



The historical record makes clear that religions teaching, and leadership are powerfully able to influence personnel conduct and commitment. Religions are key shaper of people's worldviews and are formulators of their most cherished values. Religions have provoked many sociopolitical changes and they are able to present a leading voice in environmental thinking, and establishing strong ethical foundation for supporting healthy eco systems and green lifestyles.

Comparative studies show that all faiths around the world share a common ethic based on harmony with nature, and look at environment as a religious issue. All major religions view stewardship of the earth as a moral obligation. Love and gratitude for the creation lie deep within religious life. Since religious belief is not only a matter of thought, but equally of practice, religious leaders are able to transform belief systems into environmental practice and prevent "crimes against creation".

Seicho – no – lo religious movement

Seicho – no – lo is a global religious movement founded in Japan in 1930 which from the early days has warned about man's impact on the global environment and as a consequence active participation in global environmental protection is central to its policy. Seicho – no – lo has four key ways to environmental conservation:

- ☐ Caring for the environment – a life time practice
- ☐ Efforts towards ISO 14001 Certification
- ☐ Use of solar power generation and other renewable natural energy sources
- ☐ Collection of contributions for world reforestation

The positive results which the Japanese based Seicho – no – lo religious movement has achieved toward environmental protection can convey a message for other religious movement and that is : Filling a gap between their religious texts and current practices of their adherents , emphasizing the implementing environment management systems, converting the concern of their own adherents into an informed commitment to take effective remedial and preventative action, giving the value to the natural resources and treating them as sacred , foster positive patterns of conduct in resources using ways, and adopting eco-friendly manners.

Conclusion:

The engagement of the world's religion is critical to effective environmental policies in connection with establishing heaven upon earth and flourishing of life for future generations. Religions leaders should address the religious dimensions of human relationships with the natural environment and reorienting their followers to show more attention, respect, restraint and responsibility toward Earth. All religions leaders carry great weight in societies so they easily provide direction for developing mutually enhancing human- environment relations and present ethics of respect for nature and future generation. Under their efforts societies come to this understanding that spiritual living and environmental practice go together. Seicho – no – lo religious movement in Japan demonstrates that living a life based on religious attitudes toward making environmental stewardship how great results can produce.



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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



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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



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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 milestone 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.



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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.



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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 Monastery. In Girne: Kyrenia Castle, Bellapais Abbey, St. Hilarion Castle and Buffavento Castle, and in Güzelyurt: Soli Ruins, St. Mamas Monastery 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 Coriacea*, 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 raki, 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.

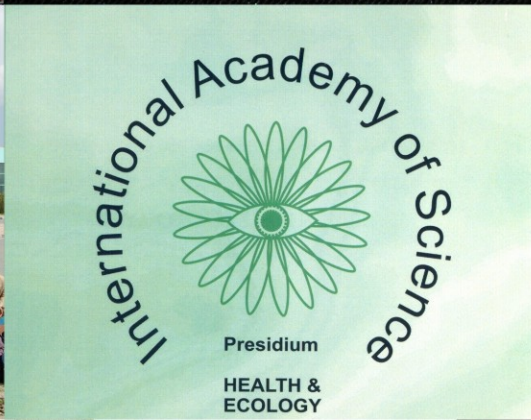
Electricity: 240 volts A/C. 50 Hz.

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

www.neu.edu.tr
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