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Edited by Prof.Dr. Hüseyin Gökçekuş

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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

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. Günsel
Founding Rector of the Near East University

Message from President of the Conference

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

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

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

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

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

OPENING SPEECHES

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

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

His Excellency Secretary General Organization of the Islamic Conference,

Distinguished guests, colleagues, ladies and gentlemen,

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

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

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

Thank you, thank you all.

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

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

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

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

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

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

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

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

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

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

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

Most important guidelines for Sustainable Development are:
-Demographic control.
-Reforestation.
-Protection of agricultural areas.
-Energy saving.
-Development of renewable energy sources.
-Improvement in the implementation of existing legislation.
-Integrating environmental concerns into other policies.
-Working in cooperation with the business.
-Educating people to change their unfriendly behaviors towards the environment.
-Environmental accounting in land-use planning and management decisions.

Global Environmental strategy is a must.

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

The main message of our Conference will contribute to the worldwide debate and create a 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.

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.

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.

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

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

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

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

Thank you for bearing with me.

Eşref CERRAHOĞLU
Chairman of Executive Board of TURMEPA, TURKEY

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

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

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

Thank you.

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.

Asım VEHBI
Minister of Environment and Natural Resources, TRNC

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

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

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

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

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

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

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

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

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

Distinguished contributors, participants and honorable guests,

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

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

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

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

Thank you.

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

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

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

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

Thank you.

Türkekul KURTTEKIN
Turkish Ambassador to Lefkoşa, TRNC

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

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

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

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

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

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

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

Thank you.

Ferdi Sabit SOYER
Prime Minister of TRNC

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

I would like to greet and welcome you all.

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

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

Thank you.

Prof. Dr. Ekmeleddin İHSANOĞLU
OIC Secretary General

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

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

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

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

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

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

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

Mr. President, Your excellencies, Ladies and Gentlemen,

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

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

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

Mehmet Ali TALAT
President of TRNC

Distinguished guests, dear participants,

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

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

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

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

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

1.Threats to Survival and Sustainability

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

2.Technological Advances towards Survival and Sustainability

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

3.Activities and Tools for Social Change

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

4.Defining Goals for Sustainable Societies

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

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

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

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

-interactions and understanding of people the world over,
-fair and equitable distribution of benefits derived from resources,
-conservation of biodiversity and protection of our resources,
-the water use efficiency is very important as the availability of water is becoming scarce,
-we need more international collaboration and research for wider and reliable speculation,
-management of plans and their implementation to save the critical aspects of our heritage and environment,
-cooperation of scientific disciplines is necessary to address the situation,
-countries must work together and minimize the impact of borders on science and maximize the benefit for all mankind,
-in order to obtain global sustainability, the curses of 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.

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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PROCEEDINGS

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MT-7: Environmental Awareness, Education and Lifelong Learning

VOLUME 6

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Near East University, Nicosia-Northern Cyprus

ENVIRONMENTAL AWARENESS, EDUCATION AND LIFE LONG LEARNING

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In the paper titled above, it has been stressed at the beginning that the changes in environment are basically caused due to the actions of man. Some of these changes are reversible and some irreversible. Many members of the public all over the world do not have a detailed idea about these changes. Hence, actions on their part as warranted by the science of environment are not always on the right track. Even the politicians, administrators and managers responsible for the protection of environment are not even aware of the mechanisms in which the degradation of the environment takes place. Thus, it has been pointed out that the environmental awareness is a matter of continuous education and life-long learning. The newer technologies bring new environmental challenges, and unless people are aware of this, the best dividends of the technologies may not be obtained. The players who can be of immense value in the overall processes of creating environmental awareness have been identified. Some of these players, namely, teachers in schools, the science clubs, the scientific societies and academies, the print and electronic media, can develop awareness programs of both local, regional and global interest. The do's and don't's that these players should address themselves to, have also been identified. Three major factors that have been highlighted in the awareness program are matters of lifestyles, energy use patterns and waste disposal systems. Another point which has been elaborated for the purpose of consciousness generation, is the use of locally available bio-degradable materials. It has also been pointed out that every country should have adequate bodies of agencies in order to identify its stock of Flora and Fauna, lest knowledge of this should be lost mainly in view of the fact that the so called 'process of urbanization' is posing a serious threat to many of the life forms that are of immense value in preserving the ecological balance of nature. Finally, the nature of international collaboration so badly needed in avoiding man-made disasters through indiscriminate policies and actions and also in preserving the Flora and the Fauna of our planet has been outlined.

1. Introduction

The need for environmental awareness has been felt ever since man appeared on planet earth. Before we highlight different aspects of environmental awareness, education and life long learning, it is necessary to know how environmental changes are made. It is also necessary to stress that the major player for changes in the environment is man himself. Human actions can disturb the balance of the environment, and again human actions can restore the balance. But this restoration may not be always complete. Some of the changes are irreversible while some are reversible. If big ozone holes are created, the changes would be somewhat irreversible, whereas if there is a strong buildup of carbon-di-oxide in our environment, we can reverse it by planting a lot of trees and setting up the right energy use patterns. Thus, for the purpose of creation of environmental awareness, it is necessary to understand our actions.

The major factors which should govern our actions and have to be highlighted in the awareness program are:

a. Matters of lifestyles.
b. Energy use patterns.
c. Waste-disposal systems.

Talking of lifestyle, one notices continuous changes in lifestyles more accentuated these days by the process of globalization. The process of consumerism and the manner of media advertisement are making men and women all over the world crave for more things than they actually need, in terms of eating, drinking, clothing and habitation. In this connection, one could be reminded of a verse of the Holy Quran (7: 31) that says: "O Children of Adam! Wear your beautiful apparel every time and place of prayer; eat and drink; But waste not by excess, For Allah loves not the wasters" This verse also reminds us of the existing irony that while there are many people who are eating more than necessary, there are innumerable others who do not have the minimum amount of food for their existence. Those who are consuming more, are creating a second catastrophe, namely, that they are creating more wastes to be disposed into nature. And it is this waste disposal system that is, in turn, creating more hazards for the environment. In the processing of more food and more energy, we are putting unusual pressures on the natural reserves of the earth. Hence comes the concept of "sustainable development". The essential message of 'doing more with less' has often been neglected especially by the citizens of the developed countries. Thus, the present state-of-affairs in so far as its impact on the environmental aspects are concerned, must be changed. The question is, how?

may enact a number of legal measures for doing the right thing at the right time, but the best measure is, of course, the creation of environmental awareness. And the players who can be involved in this game of awareness, are schools, science clubs, scientific societies and Academies, and the print and electronic media. Communicating with the members of the public can indeed be a very useful idea, and I am glad to notice, that the Near East university, besides imparting formal education, is trying to establish close relations with the wider community, and has already set up a life-long education centre to provide a wide variety of adult education courses. Environmental awareness could certainly be one of these courses. However, the point that one must remember is that it is very difficult to reform an adult. Thus, the amount of time and energy spent on well-moulded adults could better be spent on young children with better prospects of success. I, personally, feel that the schools are the best places for creating environmental awareness and education.

2. Program for environmental awareness and education in schools

In the context of the present day environmental crisis and the frequent disasters experienced in different countries, namely, floods, cyclones, draughts, earthquakes, tsunami etc. the school children could better be informed not only of the possible causes of these disasters, but also of the risk reduction methodology. Recognizing that the degradation and protection of environment and the mitigation of disasters are multi-faceted phenomena requiring inputs and co-operations from different sectors, and one may ask: why should school children be involved in this? The answer is: children should not merely be regarded as children, but they should be considered as human beings. Kindness, love and affection, patriotism, concern for man, plants and animals etc. exist in children in the same way as they exist in adults.

In connection with the responsiveness of the young kids to come to the services of humanity, I would like to narrate a true story.

Some years back, a ten-year-old village boy in Bangladesh noticed, while playing near a railway line, that the nuts and bolts of a joint in the railway line were missing. The boy understood immediately that this could cause a train accident resulting in loss of lives of many. He knew that a line man can stop a train waving a red flag. The idea then dawned immediately on the boy's mind to find something red. He went to his home nearby, and hurriedly brought his mother's red petticoat, tied it to a long stick and was waving it to the approaching train. The driver of the train sensed something wrong, and stopped the train. He was indeed, very impressed with the boy's responsibility for avoiding a catastrophic accident. In fact, a local television channel ATN produced a documentary film based on this event, and won the famous EMMY award. If a child can understand the effects of a man-made disaster, why can he not be made to understand natural disasters and their causes and effects if put in simple parlance.

Consider, for example, the cause of floods. There are many causes of flood. One major cause is the rise of the river bed due to siltation. And as a result, the slope of the river is diminished. One may think of dredging as a corrective measure, but if dredging is done only for the sake of dredging, and if the slope in the river bed is still absent, then the problem remains the same as before. It is through dredging that we have to create a slope. Now, the students can be made to understand the phenomenon very well if they know only a simple but important property of water, namely, that water flows downwards till it meets a level. That water finds its own level could be made apparent by an experiment that can be performed using local pottery rather than imported glassware, and students can have fun when they pour water into the following pitchers having openings at different heights.

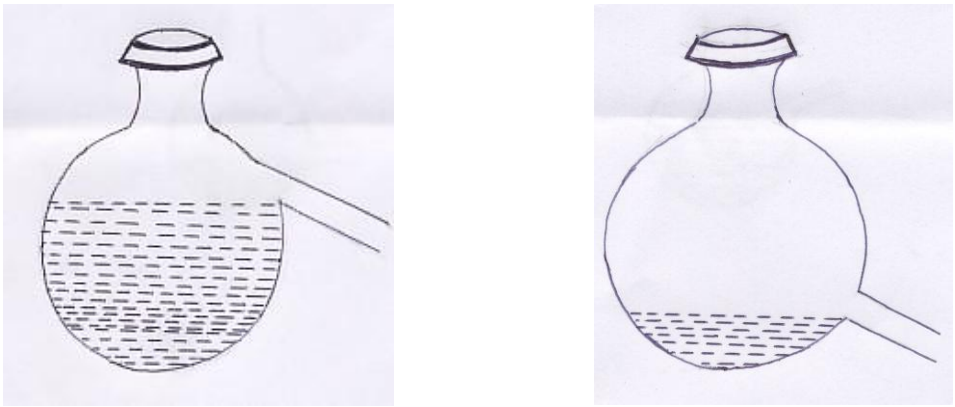

Figure: Two pitchers having openings at different heights.

The abovementioned simple principle namely 'water finds its own level' has profound applications in the dredging of rivers as already mentioned. Dredging a river is of no use unless a slope can be created in the river bed.

Now, talking about cyclones, it is often heard that in countries with coastal belts, fishermen sailing deep into the sea often miss the warning signals issued on the eve of approaching cyclones. But if schools are provided with radios and if there is a 'radio listening hour', then boys and girls can receive the warning messages and can prevail on their parents not to go out into the sea during the stormy weather, but to keep their vessels near the shores. In this way, a number of calamities could be avoided.

Again, if along the coastal belts, trees, especially the coconut trees, are planted, then these can reduce the degree of calamities in a number of ways. Coconut trees can lessen the speed of the whirlwind and can pacify water-surges. Actually, a belt of trees work as an effective form of natural dam. But the advantage of this natural dam over any artificial one is that in case of the natural dam, even if water finds its way through the trees, it can go down afterwards. But in the case of normal dams, if the surging sea water overtakes the dam and is therefore trapped, it causes salinity to soil, leaving the latter unusable for cultivation and for hatchery.

Another advantage of a natural dam made of coconut trees is that since every part of the tree is useful for man, they can obtain economic benefits from coconut trees. The point of discussing these issues is to insist on the fact that education for protection of environment as well as for disaster management should start from the school children. These children, when grown up, could adopt the measures outlined even if adults have ignored those.

About air pollution, a number of observations can be made to determine its effects. For example, if exhausts form cars is collected and analyzed in the chemistry laboratory, students could easily find out the harmful carbon compounds, which being breathed into the lungs, can cause serious problems. Similarly, if a puff of a cigarette is exhaled onto a tissue paper and if again, this is analyzed in the laboratory, a single puff could be seen as carrying thousands of chemicals that pose a serious threat to our bodies.

The necessity of preserving the water bodies in the cities and the villages of the country could also be explained to the students by pointing out that the algae in the water bodies do contribute a lot in reducing the carbon-di-oxide component in the air.

One of the greatest challenges of mankind has been the management of industrial and domestic waste management, let alone nuclear wastes. Since industrial waste matter contains ingredients that may be toxic, the disposal and treatment of such wastes must be done in such a manner, that the flora and fauna on soil or in the water are not threatened. Again, every country should have adequate bodies in order to identify the stock of flora and fauna lest knowledge of these should be lost mainly in view of the fact that the so called process of urbanization is posing a serious threat to many of the life forms that are of immense value in preserving the ecological balance of nature. School children should be made aware of non-biodegradable wastes (e.g. polythene bags) and could be discouraged to use those materials.

In Bangladesh, a readily available solution to the problem of using non biodegradable polythene bags is the use of jute bags.

A number of disadvantages are mentioned when it comes to using jute. For example, jute is not water resistant and fire resistant, and jute products shred. But the Almighty has endowed jute with one great advantage, namely, its quality of bio-degradability. Jute agrees with nature harmoniously. Jute is free from the disadvantages that other artificial materials have. Therefore, students can be encouraged to use jute in every possible ways, in the form of school bags to carry their books into and also in planting saplings. Net bags made of jute can be very effectively used for shopping instead of polythene bags. This is where international cooperation in the production and marketing of jute bags would be of paramount importance.
As regards other environmental disasters, namely tsunami and earthquakes, the students could be made conversant with the causative mechanisms of these disasters with the use of very simple models. As far as earthquake is concerned, the damage of a considerable amount of life and property can be avoided if a correct building code is followed while erecting houses in earthquake prone areas. If students are taught the effectiveness of the building code, then they themselves could influence their parents to follow this code while constructing houses.

3. Life long education

In the case of environment protection, life long education is a must. Some five or six decades ago, people in many developing countries were not very familiar with the use of tube-wells. Rain water, rivers and irrigation canals were used as sources of surface water. The use of ground water, through the employment of shallow and deep tube-wells brought about a significant change in agricultural production, but not, however, without cost for our environment. With repeated uses of underground water, the water level goes down, leaving a significant apprehension of the erosion of soil. Furthermore, through frequent uses of ground water, a number of minerals is deposited in the agricultural fields, and sometimes, soil, to some extent, behaves like cement. Now, the old-timers who had later adapted themselves to this ground water agriculture, must also be conversant with the methods of detecting trace element analysis in soil, air and water. Such trace element analyses were not strictly in vogue some sixty years ago. Methods of analysis of the trace elements involve different techniques involving PIXE (Particle Induced X-ray emission) and Atomic Mass Absorption Spectrophotometry, and have opened new vistas of detecting what is there in our environment. Members of the public should therefore be made aware of the allowable limits of different trace elements like Lead, Mercury, Cadmium etc. in our food chain, and in our environment.

Thus, for exporting fish and agricultural products to other countries, a businessman should know the level of trace elements of various chemicals present in the exported items. And this calls for a life long learning of environmental issues.

4. The other players

Besides schools and community education centres, the Academies of sciences and the media can play a very vital role in the dissemination of information about the different aspect of environmental degradation. The "green house" effects, global warming, depletion of ozone layer, the rise of sea level and effects arising from the explosion of the Atomic bomb including the causation of the so called Nuclear Winter are phenomena that science Academies and printed and electronic media should continuously project to the members of the public. Documentary films on physical and biological effects of Atomic radiation and shock, should be shown to the members of the public to convey the message that such actions should never be repeated in future. The Academies of Sciences and Science Clubs can hold occasional public lectures to highlight the ways in which our environment is being polluted. The 'pollution of poverty' which is at the root of many of the environmental ills should also be highlighted in an adequate manner. The consequences of the denudation of forests and the need for the preservation of bio-diversity must also be stressed.

5. Conclusion

We have only one planet to live in, and in order that we live properly on this planet, our environment must be protected at all cost. It is not within the powers and responsibility of one nation to do it. All nations must play a vital role in preserving the right balance of the environment including the preservation of biodiversity. And again, within each nation, there is not just one agency that should be held responsible for this. Realizing the fact that our very existence would be at stake if environment is polluted beyond redemption, all concerned agencies including educational institutions, printed and electronic media and the responsible citizens of the civil society must be constantly on the alert for ensuring that we live on a green planet free from pollution and hunger.

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SEEKING ENVIRONMENTAL AWARENESS IN POSTMODERN FICTIONS

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At first glance it may seem understandably suspicious to seek environmental awareness in postmodern fictions; simply because the environment does not rank high on the agenda of postmodern concerns. At least this is the common ecocritical opinion according to which much postmodern writing is marked by environmental blindness. Yet, nothing is further from the truth. Although postmodernism has been accused of being indifferent to ecological reality,[1] it did not go unaffected by the ecological turn in the literary studies today, and has reoriented itself from an ecological perspective. Therefore it is possible to seek environmental awareness in postmodern fictions with reference, in particular, to the new ecologically oriented postmodernism. This new postmodernism legitimizes nature even as it challenges and subverts its traditional discourses. Deriving its ideological grounding from ecological thought, and its concepts from the scientific fields, this kind of postmodernism is both interrogative and affirmative. The environmental thinker, Jim Cheney, for example, convincingly argues that the new reconstructive postmodernism "makes use of certain notions current in contemporary environmentalism" [87]. He calls it a "transformed postmodernism" [87], which, he goes on to say, will "have a transformative effect on environmental ethics" [87]. Although mindful of Cheney's contentions, another environmental thinker, J. Baird Callicott also redefines postmodernism as reconstructive rather than deconstructive in mode and intent, stating that postmodernism as such is "creative and optimistic" [185]. He maintains that the reconstructive postmodernism is grounded in the new worldview "constituted by the 'new physics' (relativity and quantum theory) and the 'new biology' (the theory of evolution and ecology)" [184]. In my previous work, I have also theorized this new postmodernism calling it *ecocentric postmodern theory*,[2] which proposes a legitimate solution to the ecological crisis by offering to transform the anthropocentric discursive fields into ecologically oriented conceptual systems. It does so by correlating the viewpoints generated by quantum theory and the deep ecological branch of ecophilosophy. It underlines the crucial significance of implementing a holistic model of reality within the public consciousness, which is complicit with the ecocentric approach of the environmentalist discourses, and with the ontological interpretations of quantum theory advocated by such prominent physicists as J.S. Bell, de Broglie, David Bohm, John Archibald Wheeler, and Bernard d'Espagnant. What is suggested is the necessity for a wholesale discursive change in our epistemic models for creating global awareness about the fundamental interrelatedness of all things in the planetary ecosytem. Hence reconfiguring the present discourses on the basis of what Daniel R. White calls, "a new multidimensional environmental ethics and practice" [32-33] is a central issue here.

[1] See Buell [1995, 1999]; Love [1996]; Coupe [2000]; Gifford [1995]; Scigaj [1999]; Soper [1995]; Soulé [1995].
[2] . Toward an Ecocentric Postmodern Theory: Fusing Deep Ecology and Quantum Mechanics. The Trumpeter **2003**, 19 (1), 7-35.

This necessity has come to be known as "the new postmodern paradigm"[3] which signals a profound transformation in human thought and the discourses of the human sciences.

Although not all postmodern fictions would qualify for this ecological vision, we cannot disqualify them all either from environmental involvement. The incorporation of both postmodern and ecological ideas in much postmodern writing is undeniable. Viewed from this perspective, many postmodern writers[4] explore various environmental issues, and contest all dichotomies between nature and culture, world and word, and text and context. They incorporate the ecological principles of diversity, heterogeneity, multiplicity, and relationality, which also constitute postmodern ideas; and they adopt a multiperspectival approach to the real and the fictive. Even those fictions that present themselves as entirely self-conscious texts do involve a discernible environmental awareness installed in their metafictional structures. In this regard, postmodern fictions have a crucial role to play in transmitting ecological values by virtue of their worldwide popular appeal. For example, Lawrence Norfolk's *The Pope's Rhinoceros* gives a detailed account of the geological formation of the Baltic Sea, the evolution of its marine life, as well as the ecology of the West African rain forests, in its disconcertingly discontinuous and fragmentary narrative stucture. It includes observations from the point of view of animals, such as the thought of herring in the Baltic Sea, the sessions of the rats, and the discussions held by the African ants. The opening pages are narrated from the perspective of herring whose encounter with a sinking barrel containing a man is an acknowledgement of nature's onological centrality in the novel:

> The herring understand [...] They move closer, and it begins to shake... A booming sound resonates with their otoliths and their fins begin to twitch. It is almost invisible in the murk of these depths; something hangs beneath it. What? Is this finally the key to the mystery of the City? ... These are herring waters and this is the coldest water-layer. But perhaps they were mistaken, for it seems to be sinking now ...Some turn away as deep water currents take the intruder ... [Norfolk 8-9]

[3] See Best and Kellner, *The Postmodern Turn* [1995]; Michael Zimmerman, *Contesting Earth's Future* [1995]; Max Oelschlaeger, *The Idea of Wilderness: From Prehistory to the Age of Ecology* [1991]; David Ray Griffin, *The Re-Enchantment of Science: Postmodern Proposals* [1988], and *Spirituality and Science: Postmodern Visions* [1988]; Toulmin, *The return to Cosmology: Postmodern Science and the Theology of* Nature [1988]; Raphael Sassower, *Cultural Collisions: Postmodern Technoscience* [1995]; David Bohm, *Wholeness and Implicate Order* [1980].

[4] Some examples are: J.M. Coetzee's *The Lives of Animals* [1999], and *Foe* [1986]; Don Delillo's *White Noise* [1985]; John Barth's *The Tidewater Tales* [1989]; Jeanette Winterson's *Sexing the Cherry* [1989]; Paul Auster's *Timbuktu* [1999]; Yann Martel's *Life of Pi* [2002]; Jim Crace's *The Gift of Stones* [1988]; Julian Barnes's *A History of the World in 10 ½ Chapters* [1989]; and Jenny Diskis's *Only Human* [2000].

Certainly there is environmental awareness here. Postmodern fictions like this invite ecologically informed readings. Similar to historiographic metafiction, which mixes "the reflexively fictional with the verifiably historical" [Hutcheon, *Politics* 36], ecological postmodern fiction is a hybridizing mix. It is both metafictional and ecological in its self-conscious process of representing the fictional and the natural worlds. It can actually be defined as a "nonessentializing narrative" [Cheney 87] which underlines the relations between what Jim Cheney calls [87] *Mind*scapes" and "*land*scapes, often by displaying the interrelational transactions between human imagination and the environment. Such an

approach may also seem pertinent to the questions raised by ecocritics about the role of literature in helping us restore our connection to the Earth. Consider, for example, Scott Slovic's question in his recent essay, "Love is Never Abstract: Bioregionalism, Narrative Discourse and the Value of Nature:" "How can literaure and literary studies help us appreciate both local and global environmental concerns?" [18]. If we replace literaure with postmodern fiction it would even be more relevant to the discussion. The postmodern conjunction of mindscapes and landscapes can indeed stimulate ecological awareness and generate new insights about the inseparability of existence. As prominent examples, Ian Watson's *The Jonah Kit*, Jeanette Winterson's *Gut Symmetries*, A.S. Byatt's *Babel Tower*, and Graham Swift's *Waterland*, fall under this category, and can be ecologically reconceptualized as hybrid fictions that confront the postmodern and the ecological, the natural and the cultural "through their pluralizing recourse"[Hutcheon, *Poetics* 21] to multiple discourses which are often drawn from scientific disciplines, and are fictionally appropriated within what we can call their ecologized metafictional narratives. This postmodern border-crossing between the discourses of fiction and science is focused on quantum theory in some novels. They use quantum examples to challenge the dualist conception of reality, and thus to emphasize ecological values.

Winterson's *Gut Symmetries* is a perfect example for this approach. Here she uses the Grand Unified Theory from the new physics as the novel's central metaphor to invoke the fusion between mindscapes and landscapes by presenting the physicist Jove, his poet wife Stella, and his lover Alice, the female physicist, in a love triangle. Their dialogues, while cruising on the Mediterranean sea, invoke symmetries of science and art. The metaphor of GUT echoes the ecological principle of the interrelatedness of all things and beings. It must be noted here that this is not just a literary response to the new physics, but a self-conscious foregrounding of its ecological dimensions. Alice explains it as "...our place in the universe and the place of the universe in us" [97], which she says

> is proving to be one of active relationship. This is more than a scientist's credo. The separateness of our lives is a sham. Physics,mathematics, music, painting, my politics, my love for you, my work, the star-dust of my body, the spirit that impels it, clocks diurnal, time perpetual, the roll, rough, tender, swamping, liberating, breathing, moving, thinking nature, human nature and the cosmos are patterned together. [97-8]

Passages like this endorse the falsity of our belief in the separation of humanity and nature. They also echo similar statements and points made by the physicists with regards to quantum-field experiments that show that reality at its most basic level is undivided. The earliest of such statements comes from Heisenberg:

> Now we know that it is always the same matter, the same various chemical compounds that may belong to any object, to minerals as well as animals or plants; also the forces that act between the different parts of matter are ultimately the same in every kind of object [...] The world thus appears as a complicated tissue of events, in which connections of different kinds alternate or overlap or combine and thereby determine the texture of the whole. [107]

This conception of reality is the new epistemic model promoted by another physicist, John Archibald Wheeler, known as the *participatory universe*. In his words: "useful as it is under every circumstances to say that the world exists 'out there' independent of us, that view can no longer be upheld. There is a strange sense in which this is a 'participatory universe'" [qtd. in Selleri, 297]. Similarly the nobel laureate physicist Ilya Prigogine states: "whatever we call reality, it is revealed to us only through an active constuction in which we participate" [293]. In quantum physics this essential bond between the human and nonhuman reality is called *quantum contextualism* where correlated non-local connections exist between apparently separate particles, as well as between them and their observer. What this means is that, as d'Espagnant notes, "that the kind of physical reality whose regularities the principles of physics are expected to map presumably be a nonseparable whole, with properties quite different from those we are accustomed to attribute to any kind of reality"[239]. Since this is "overwhelmingly confirmed by experiment" [Norris 18], it generates profound implications for our perception of nature.

Drawing on the ecological implications of the new physics, *Gut Symmetries* generates awareness about the fundamental interconnectedness of all life, and contests our basic assumptions about the nature of reality, human and nonhuman world, and nature and culture. It explores humanity's relationship, not only to the ecosytem, but also to the entire universe on metaphoric level, and proposes this new vision of reality as a solution to restore the earth: "Say theoretical physics to most people five hundred years from now and perhaps they will say, 'Bombs and destruction.' How to explain that what we saw, briefly, dimly, was a new heaven and a new earth?" [103]. The physicist David Bohm appropriately names it as *the undivided universe*, while the Norwegian ecophilosopher Arne Naess calls this new vision, "the relational total-field image" [3].

This deep ecological vision also marks Ian Watson's *The Jonah Kit*. It explores what Callicott calls "postmodern evolutionary and ecological environmental ethic"[188], by focusing on three interrelated stories that also involve theoretical physics. Here we encounter a genetically manipulated sperm whale who has been infused with human memories, a missing boy who thinks he is a spaceman, worrying a Soviet research team working on the military and economic uses of the oceans, and a group of American astronomers in the Mexican desert, who debate about how to announce to the world their latest discovery of a sister galaxy that will collapse our reality. While watching the migrating whales on the cliffs, the astrophysicist Dr. Paul Hammond disputes the nature of reality with his colleague Dr. Morelli. Morelli believes in a "general grassroots texture of reality" [99], while Hammond, referring to his discovery of Hammond Waves, insists on his theory of a determinate universe. Morelli's response here echoes Alice's explanation of the interconnectedness of the universe in *Gut Symmetries*:

> There is a very queer interface between reality and ourselves, let's be honest. Things are by no means as plain as common sense might suggest. We participate, right? But what if the human race decrees an illogical, irrational choice? And our choice is incompatible with life and common sense? Then life can't have arisen in such a universe, to observe it. We would be lost then, indeed! Erased by our own folly. For observable "universes" are not illogical. Suppose we become irrational, will we simply vanish, leaving the owls and otters, deer and monkeys of the Earth to sustain reality, till a new higher intelligence arises? Or can we pull all reality down with us? This rare, beautiful reality! [96]

Can we really pull down all reality with us? It seems that we have the potential for causing such a catastrophy. Evidently the logic of humanity has run into its limits here. Therefore, this novel draws attention to the human responsibility for shaping the future of life on Earth. It underlines the importance of becoming earthbound and asks us to recognize ourselves, in Aldo Leopold's words, as "plain members and citizens of the land community" [89]. As another scientist tells Hammond, referring to the whales, "If another intelligent species observe the Footsteps Theorem- if we can pass it over to them- they could make a different choice! They could shift the branch we're on, before it snaps right off! [167]. Indeed, at the end of the novel the whales and dolphins take on this role when they beach themselves, in massive numbers, on a Japanese coast. The novel makes a final note to the reader: "Men must think about all this and reasses their values" [206]. The cataceans die in order to save the Earth. They die, a priest says to a peasant , because they "have sacrificed their reality, so that we can believe in this world once more, and care about her. Our world" [213].

This is a postmodern attempt to institute environmental values and awareness in the reading public, and it bears directly on the prospects for the future sustainability of the planetary ecosystem. The effect of such postmodern discourse is crucial, because it lays bare the anthropocentric cognitive structures which have indelibly marked our perceptions of nature. Perhaps the most visible results of this discordant line of reality are seen in the accelareted pollution of the ecosytem which manifests as hurricanes, floods and tornadoes occurring now almost every week. These are direct results of increased atmospheric pollution on a planetary scale, and these results are the evidence of our monumental disrespect for the Earth. Underneath this disrespect lies the dismantled and fragmented approach of the dualistic worldview. It is precisely this erratic epistemology that postmodern fictions emphatically challenge. As just noted, the associated values of the anthropocentric worldview represent, in Callicott's words, "a hostile intellectual climate for the development of a direct or nonanthropocentric environmental ethic" [188].

Evidently ecological postmodern fictions raise the issue of how reality is discursively constructed and sustained, how discourse shapes our perceptions of the world, and how it governs the way we think about reality. This is because discursive practices contain within them a set of implicit rules which determine the way in which we construct explicit rules prevailing in the social and natural environments. Therefore postmodern fictions are about "discourses which reflect upon the world of discourse" [McHale 164]. Hence their significant role in exposing the dangerous effects of anthropocentric discourses and their standard truth claims on the human consciousness and socio-economic practices. In this sense, postmodern fictions put the ideological grounding of the discursive formations of nature into what Linda

Hutcheon calls "a site of de-naturalizing critique" [*Politics* 3]. In other words, as Hutcheon argues, "postmodernism works to 'de-doxify'[5] our cultural representations and their political import" [*Politics* 3]. According to Hutcheon, the "postmodern process of cultural 'de-doxification' is a theoretical position that seems to assert that we can only know the world through a network of socially established meaning systems, the discourses of our culture" [7]. The sustainability of environmental awareness, then, depends on developing ecologically oriented discourses.

It is important to note that postmodern fiction is context dependent, in that it does not see the world comprised of texts and thus independent of context. It does not divide the world up into what Rorty calls "internal and external relations," or "intrinsic vs.extrinsic properties" [98]. The "representationalist problematic of language and thought to the world," or the "relations between linguistic and extra-linguistic items" [Rorty 151] are resolved by postmodern contextualism without backsliding into realist epistemologies. Many postmodern fictions integrate texts and contexts, and stage a confrontation between language and reality in which the fictional verbal reality overlaps with the ontological reality of the natural environments. However, this is a problematic integration, because there is both rejection and acceptance of fiction's mimetic engagement with the world. As in the case of Graham Swift's *Waterland* and A.S Byatt's *Babel Tower*, the verbal representations of nature do not necessarily serve as testimony to the empirical reality itself, but they make us aware of the "seamlessness of the join between the natural and the cultural" [Hutcheon, *Politics* 53]. This is because postmodern fictions use *double coding*[6] in their narrative structures. That is the use of an uneasy fusion of self-reflexive and referential strategies of writing, or realist and textualist positions in a multiperspectival narrative structure. In other words, the connection between the world and the word is problematized in the form of entangled and competing representations of the world we live in in order to challenge the very nature of binary thinking and its implicit hierarchies that prioritize human exploitation of the non-human world. Because the postmodern devices of discontinuity, decentering, disruption, paradox, ambiguity, indeterminacy, ironic distance, language games, self-reflexivity, intertextuality and contingency are used predominantly in the postmodern fictions to contest closure, order and

[5] Hutcheon [3] adopts Roland Barthes's notion of the "doxa" as general public opinion or the 'Voice of Nature' and consensus. Also see *Roland Barthes by Roland Barthes* [47].

[6] Theorizing postmodern architecture Charles Jencks states that the most prevalent aspect of postmodernism is its *double-coding*, which he explains as "double meaning and the *coincidentia oppositorum*" [288]. In postmodern fictions realist and metafictional narrative techiniques, and the fictional and the worldly coexist which allows both textual and contextual theoretical positions about the nature of reality to be emplotted without falling into what Linda Hutcheon calls "the classic realist system of representation" [15] as well as into extreme textualism.

unity, and all universalizing drives, their *double-coding* opens a new conceptual move on the ecological discussions. This is the postmodern assertion of the logic of "both/and", instead of "either/or" thinking that enables a deep questioning and critique of the epistemological foundations of the modern, dualistic paradigm. In short, like the ecological thought, postmodern thought also rejects the "fundamental dichotomies upon which modern thought is based" [White 33].

A.S. Byatt's *Babel Tower* exemplifies this approach. It is an intertextual tale about 1960s London focusing on the efficacy of language at representing or altering reality. The main figure, Frederica Potter, is obssessed with the manipulative power and order of language through which she comes to recognize "the illusory nature of orders, which are perceived to be man-made, provisional and unstable" [379]. Another character who gives lenghty speeches about language, Wijnnobel, claims that "*what we can think* is a function of our linguistic competence" [186]. His obsession with language is inherited from his grandfather who was also immersed in deciphering the ur- language, the original speech of mankind before the fall of Babel Tower: "in the days before Babel . . . words had been things and things had been words, they had been *one*" [190], which Wijnnobel thinks is "something more natural, more intrinsically part of the nature of things, a tongue in which there were words for lion, lamb, apple, snake, tree, good, evil, which wholly contained and corresponded to *all* their power and meaning. Elephants spoke elephant, earwig spoke earwig" [191]. Although this conception of human language and relations with the natural world is problematized in the novel, it is done so in order to point out how our environmental perceptions are informed by the anthropocentric thought patterns, which impose an implicit set of perilious values upon the natural world. Postmodern fictions as such posit that since the function of literary discourse underlies the cultural unconscious, and compells us to intepret the world in terms of the encoded cultural signifiers, our discursive practices and all cultural codes must be refashioned according to an ecologically accountable epistemology. As Fritjoff Capra writes, "if the new ecological awareness is to become part of our collective consciousness" [454], all knowledge and all systems of information must be restructured and transmitted effectively. This is the major concern of many postmodern fictions like *Babel Tower*. Indeed *Babel Tower* can be read as a reorientation of self-conscious fiction from the implicitly underlined ecological perspectives witin the poetics and politics of ecocentric postmodernism. Due to its double-coding *Babel Tower* can also be read as a juxtaposition of multiple discourses and texts, to explore new ways of thinking about the relationship between literature and the environment, and to suggest connections between textualism and environmentalism in the novel's theoretical engagement with the postmodern as well as ecological understanding of the function of language.

In the present crisis of sustainability the postmodern interrogation of the divide between word and world, and human and non-human realities, and indeed the fundamental essence of binary thinking, prompt readers to reconsider their existence in the world as not only shaped and defined by language, but by interconnected relations to the entire biotic communities. If their existence continues to be threatened so is ours. The natural environment in the ecocentric postmodern perspective cannot be enclosed in mere textualism, social constructionism, and the relativistic play of signifiers. This is the underlying thematics of postmodern fictions behind their linguistic intricacies. Although postmodernism challenges "the realist notion of representation that presumes the transparency of the medium and thus the direct and natural link between sign and referent or between word and world" [Hutcheon, *Politics* 34],

it does not deny the "real" altogether. What happens is that it exposes the process of how that "real is described, and how it is put into discourse" [*Politics* 33]; and thus "contests mastery and totalization often by unmasking both their powers and their limitations" [*Politics* 37]. The ecological implications of such postmodernist representations are quite rewarding, because it becomes evident that when we are made aware of the existence of the natural environment as representation, we can question in what cultural conventions and ideologies this representation is fashioned, and thus unmask their implicit truth claims.

In this way the real is neither confined into textuality nor accepted as an unproblematicly accurate verbal image. The *real* in the postmodern context is presented in such a way as to raise questions about the ability of representational systems to make epistemological and ontological claims.

Graham Swift's *Waterland* is a prime example for such questioning. It thematizes the processes of natural and human interactions. *Waterland* is also a typical historiographic metafiction which directly addresses the narrative representations of both fiction and history, and connects them to the natural history of the Fenlands in Eastern England. The Fens, which were originally under water, are vast, desolate marsh areas with abundant bird and sea life. But, gradually over time the firm ground was interspersed with rivers, reed-beds and pools of water. It happened when silt from the rivers and sea accumulated in the Fens leading to the formation of peat responsible for the fertile soil in the region. The history of the Fens is intertwined with the personal history of the narrator Tom Crick, the secondary- school history teacher who is about to be fired, because history is considered to be a useless subject by the Headmaster. Crick connects his family history to the history of the Fens since his family has played a historical role in draining and reclaiming the land. His ancestors were originally "water people" who were against land drainage. Later they became builders of sluices, dikes and canals, and turned into keepers of locks and windmills. However, as Crick tells his students, "they did not forget, in their muddy labours, their swampy origins; that, however much you resist them, the waters will return; that the land sinks; silt collects; that something in nature wants to go back" [14-15]. As Hutcheon rightly states, silt is a "perfect image of postmodern paradox" here [*Politics* 55]. Postmodernism installs and then subverts everything it challenges. Similarly silt "obstructs as it builds; unmasks as it makes" [10]. Crick defines silt as something which "shapes and undermines continents; which demolishes as it builds; which is simultaneous accretion and erosion; neither progress nor decay" [7]. Therefore silt is a perfect metaphor both for postmodern and ecological ideas. In terms of both, silt represents the process of construction and deconstruction of reality in the novel. "Just as it raises the land, drives back the sea and allows peat to mature, so it impedes the flow of rivers, retsricts their outfall renders the newly-formed land constantly liable to flooding and blocks the escape of floodwater" [8]. Crick says, "what silt began, man continued. Land reclamation. Drainage" [8]. But the Fens challenge all human attempts to transform the land. They refuse to to be enclosed by the canal walls and damns, and to fit into human stories, to be caught in, shaped and controlled by the human narratives of progress represented by land reclamation. The Fens simply refuse to be re-mapped, and ultimately challenge the technological advancement of man against nature. "To live in the Fens is to receive strong doses of reality. The great, flat monotony of reality. The wide empty space of reality" [15] says Crick to underline nature's resistance to textualizations of reality. As Tom Cricks's narrative of the natural and artifical history indicates, nature subverts its social and cultural constructions.

Tom Crick uses the Fens as an active subject of his story, because they determine the ontological reality in the narrative to point to the futility of the gand narratives of progress. He reminds his students that "Only nature knows neither memory nor history. But man ... is the story-telling animal" [53]; ironically however, man's stubborn desire to order and shape reality and nature in order to protect himself from chaos and disorder by means of story-telling, proves the opposite and makes the humans lose their connection to the natural forces.

The Crick family, as swamp people, lose their sense of belonging and their identity when the swamps are drained: "They ceased to be water people and became land people; they ceased to fish and fowl and became plumbers of the land. They joined in the destiny of the Fens ... For a century and a half they dug, drained and pumped the land ..." [11].

Waterland makes us question the futility of the human struggle to control the natural world by presenting the history of land reclamation and man's battle against the Fens as an absurd project. "Strictly speaking," says Crick, "they are never reclaimed, only being reclaimed" [8]. As Tom Crick recognizes, "this thing called civilization ... It's artificial ... It's not natural ... It breaks easily" [291]. He also sheds a critical light on human progress: "There's this thing called progress. But it doesn't progress. It doesn't go anywhere. Because as progress progresses the world can slip away ... My humble model for progress is the reclamation of land" [291]. These lines show that typical postmodern novels, like *Waterland*, powerfully transmit environmental awareness by exposing the absurdity of economic progress to the reader.

As all these novels demonstrate, the effect of postmodern literary discourse in changing our cultural, social, political and economic relationships with the biotic communities to more ecologically sustainable interactions is quite significant with respect to the future sustainability of the planetary ecosytem.

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ENVIRONMENTAL EDUCATION IN BOSNIA AND HERZEGOVINA: STATUS, VISIONS AND NEEDS

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Environment is very low on the political agenda in spite of the severe environmental problems facing BiH, the necessity of addressing environmental issues in order to have a competitive private sector and as a factor EU accession process. Education has a mayor role in achieving this objective. This requires a reorient of the education system, policy and practice in order to empower everyone, young and old, to make decisions and act in culturally appropriate and locally relevant ways of addressing the problems threatening our common future. In this way, people of all ages are empowered to develop and evaluate alternative visions of a sustainable future and to fulfill these visions through creatively cooperating with others.

The educational system in BiH is in the process of reforming its curricula. However, during the ongoing process of education reform there has been very little progress regarding development of environmental curricula. There is currently no common approach to environmental education in BiH which ranges: i) Integration of environmental issues into curricula of existing subjects, across ii) Introduction of new subjects, to iii) Extracurricular activities. Bosnia and Herzegovina have no specific policy developed in relation to United Nations Decade of Education for Sustainable Development (2005-2014) that was adopted by the United Nations General Assembly in December 2002, resolution 57/254.

This paper review research results on current status, needs and visions for the education sector towards environmental education and awareness. The research was conducted under the framework of the EC CARDS "Environmental Public Awareness" project.

Key words: *environment, education, awareness*

INTRODUCTION

The educational system in Bosnia and Herzegovina (BiH) is in the process of curriculum reforming. It is an ongoing process expected to be finished no later than 2010[8]. Poverty Reduction Strategy Paper (PRSP) 2004 – 2007, has recognized that education is one of the means of fight poverty. Under coordination of the OSCE a guiding education strategy paper was written and presented in November 2002. The Reform paper is signed by both BiH entities and all cantons in Federation of BiH. Its overriding objective is to develop a modern, high quality de-politicized education system in BiH with full and equal access for all.

Since its signing, the Education Reform Strategy has served as a blueprint for reform and has guided the work of numerous expert groups and task forces endeavoring to implement its pledges. One of the pledges aims to "Develop a modern curriculum framework for all levels of primary and general secondary school education, encompassing the entire knowledge of subjects, and focusing on relevant and contemporary knowledge skills and attitudes to enable students to face challenges of the 21st century."

At this initial stage the work is focused on developing a common curricular core. It has been decided to use a common Curricular Core in primary and general secondary schools from the beginning of school year 2003/2004, but this process has yet to be fully implemented [5].

However, during the ongoing process of education reform very little progress regarding development of environmental curricula has been made. There is no specific policy developed in relation to United Nations Decade of Education for Sustainable Development (2005-2014) initiative as adopted by the United Nations General Assembly in December 2002, in resolution 57/254 [2]. Education for sustainable development (ESD) will aim to demonstrate the features such as learning for sustainable development embedded across the curriculum, not as a separate subject, with critical thinking and problem solving skills aimed at providing the confidence to address the dilemmas and challenges of sustainable development. Teaching that is geared simply towards passing on the knowledge should be recast into an approach in which teachers and students work together to acquire knowledge, play a role in shaping the environment of their educational institutions, and etc.

At this moment there is no common approach to environmental education in BiH, it could be stated that it is not harmonized and varies from integration of environmental issues into curricula of existing subjects, introduction of new subjects and extracurricular activities.

The project “Environmental Public Awareness”(EPA), which is in the framework of the EC CARDS Program, is implemented by the consulting company Carl Bro a/s from Denmark whose local partner is Center for Environmentally Sustainable Development (CESD) from BiH is created to fulfil the temporary gap in environmental education in BiH. The project started in February 2005, and will last in 2007 [4].

[8] «Message to Bosnia and Herzegovina Citizens – Education Reform” Paper, which was signed by all Ministers of Education in Bosnia and Herzegovina at a meeting of the Peace Implementation Council in Brussels in November 2002

1. OBJECTIVES AND ACTIVITIES IN THE FIELD OF EDUCATION THROUGH CARDS EPA PROJECT

The overall project objective is to contribute toward creating conditions for sustainable development in Bosnia and Herzegovina. Since the education system is a key role player in reaching out to deliver knowledge, raise awareness and change the overall mindset of the people. The BiH education sector is undergoing reform and has the potential and the interest in developing the curricular/extracurricular environmental activities. The project aims to reach a synergy between voluntary contributions and activities of students and teachers, school campaigns, and collaboration with school officials in teacher education and curricula development. Therefore, education was the target group for the project, including therein primary schools to universities. An expected result of the project is that Bosnian teachers include environment-related courses/activities on environment in schools creating a more informed civil society in BiH and increasing its awareness about the environment. The project team has worked on creating platforms such as teacher networks for environmental issues.

Bosnia and Herzegovina has a lack of environmental content within the existing curricula and a lack of awareness in general. More knowledge about the environment and more capacity to engage in environment-related activities to current and future teachers have been provided by the project. Initially, the research on the status of environmental education in the entire BiH focused on surveying the current situation in schools.

A lack of educational materials was found and the team encouraged teachers to disseminate more information related to environmental issues through different school activities. The project team provided support to students and teachers for preparation of articles in the journals such as “Palcic” (Little Thumb), “5Plus” for students and “”Nasa skola” (Our School) for teachers. Also, a seminar series was created for senior students at teachers training colleges in all BiH universities. For this purpose a suitable didactical manual “Living in Harmony with Nature” was created.

2. CARDS EPA SURVEY ON THE FRAMEWORK OF THE EDUCATIONAL SECTOR

The purpose of the survey was to examine the level of environmental awareness in the population and the presence of the environmental problematic in the curriculum. A questionnaire form of a survey was implemented, with a sample of 286 schools from the entire BiH (192 primary and 74 secondary schools). *The qquestionnaire was designed with two typological groups in mind: the schools that do have an organized extra-curriculum environmental section and for those that do not* [4].

The hypothesis were:

- Environmental thematic is not integrated into the curriculum
- School base their environmental education on activities on extra-curricular environmental groups and lectures within the subjects of “Biology”, “Nature and society” and “Culture of living”

Key questions:

- Is there an extra-curriculum environmental section in the school?
- What activities is the section implementing?
- Are the environmental issues covered within the framework of specific subjects? If so which ones?
- Does the school partcipates in competitions?
- Do teachers attend seminars on the subject of environmental protection?
- Do the teachers need a training programme?
- Does the school cooperate in with the private sector and the local community in project implementation?

It was found that extra-curricular environmental sections in primary and secondary school exist in 97,5% of cases. Schools in the remaining 2,5% which do not implement these activities state the lack of material and financial support as the main reason for the current situation.

Examples of extra-curricular environmental sections' activities are implemented are as follows: collecting old paper in the school, festivals, competitions, hometown recycling campaigns, cleaning campaigns, forestry and schoolyard arrangement activities.

Environmental topics are not suficiently integrated into the curriculum. Evaluation of school questionnaires for schools showed that teachers prepare lectures and perform practical exercises related to environment within their regular classes. Results of schools questioned which integrated environmental issues in specific subjects in BiH are shown on Figure 1.

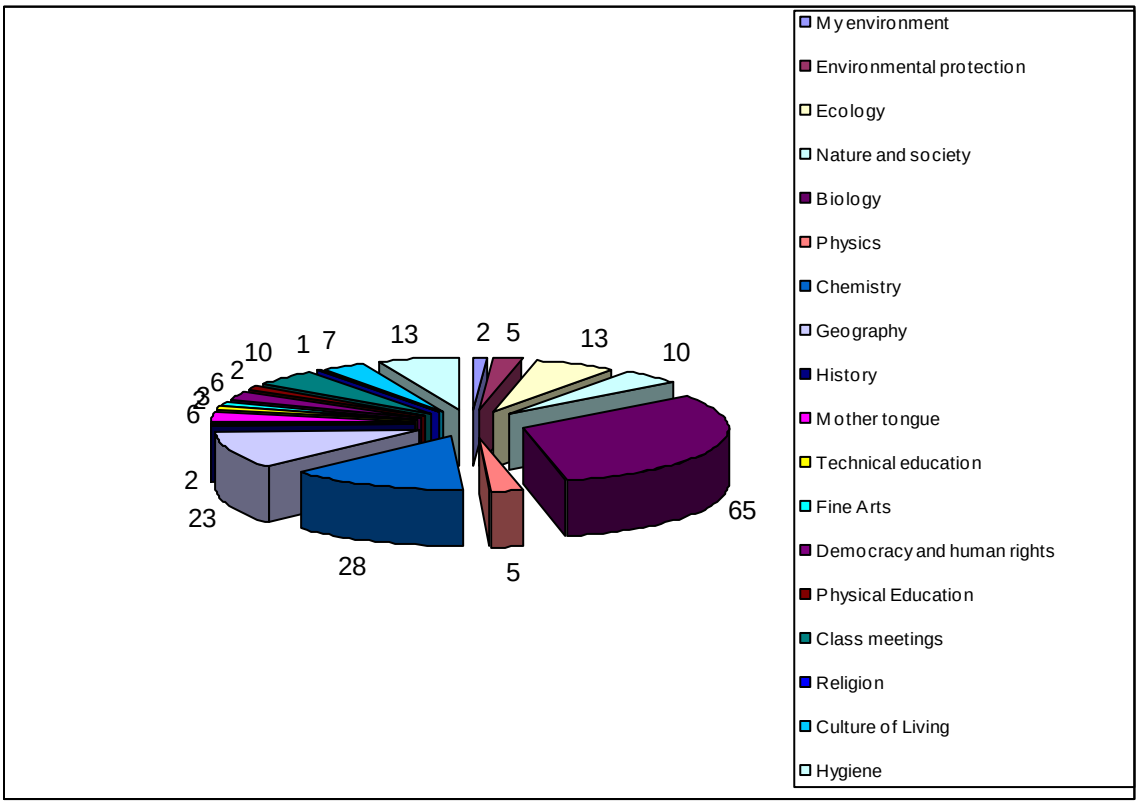

Figure 1. (Integration of environmental issues into curricula in %)

Biology, chemistry and geography show an expected behaviour in including the environmental issues in the lectures, but for others current levels are not sufficient and should be improved upon.

Very few secondary vocational schools from Tuzla reported in the questionnaires that they environmental issues have been integrated into subjects like: Construction materials (Secondary School for Civil Engineering), Electro-energetic and Networks (Secondary School for Electro-Energetic) and Goods (Secondary School for Trade).

The environmental issues that have been a subject of the teaching process are: pollution of air, soil and water, global climate change, alternative energy sources. Methodology mostly in use is presentation, while some schools implement working groups as well as practical field work. However, the number of lessons and practical exercises in the field of environment depends mostly on teacher's interest. Answers vary from „very rarely" to „continuously". There are also initiatives to introduce a new subject for primary school education that will cover environmental issues. The subject "My environment" has been introduced. There is, however, a disharmony in curriculum development for this subject. The analysis of new curriculum for the first grade shows that no substantial changes have been made. The name of the subject "Nature and Society" was simply changed into "My environment". However, introduction of new subject is not in line with the principle of an interdisciplinary and holistic approach as specified by ESD: "Learning for sustainable development embedded in the whole curriculum, not as a separate subject" [2].

In some schools maintain ecological clubs (81% of questioned primary and 75% of secondary schools). Membership in the ecological clubs varies from 5 to 150 students, with the average size around 30 members [4]. Activities of ecological clubs mentioned in the questionnaires are similar as mentioned above.

It is noticed that major extracurricular school activities are related to school yard cleaning and planting and forestry campaigns outside the school area. From environmental point of view "cleaning campaigns" have a weak education massage, wherein the students learn that "pollution is to be cleaned" rather than it is to be avoided or prevented. A low percentage of schools implements activities designed to teach pollution prevention, such as recycling campaigns.

Some schools are implementing a multi-method approach as proposed by ESD with activities such as: art, drama, literature, debate and competitions. This represents a solid approach in which teachers and students work together to acquire knowledge and play a role in shaping the environment of their educational institutions. Some schools have good cooperation with public utilities, civil society organizations (CSOs) and local authorities. Environmental education programs are performed in cooperation with CSOs are also good examples of cooperation with local community (paper recycling campaigns, eco-camps, composting, workshops, etc).

Questionnaires specified membership in the „Eco Network of BiH", as well as cooperation with the numerous CSOs, placed in the context with the membership of some „network". The activities have been in the field of cleaning and planning of the city and cleaning of the slopes of rivers, as well as support of numerous other actions related to ecology (quizzes, literature and art works). This is very much in line with the recommendation from the ESD to involve the public as much as possible by accepting the responsibility and in this way strengthen the public awareness towards sustainable development.

The schools specified in the questionnaires that some teachers have participated in training on environmental issues (49%). A 100% of questioned schools express their interest in further education in this field. However, the CARDS EPA Team has addressed those needs by organizing a series of eight training events for future teachers at all universities in BiH. The schools also cooperate among themselves in the area of the same municipality or city. The activities are mostly focused on organizing and cleaning of the local area, celebration of the important environmental dates and other.

3. VISIONS FOR FUTURE ACHIEVEMENTS IN EDUCATION SECTOR

The vision of the education sector in BiH is to support the UNECE Strategy for Education for Sustainable Development [6]. The aim of this Strategy is to encourage UNECE member States to develop and incorporate ESD into their formal education systems, in all relevant subjects, and in non-formal education. This will provide people with knowledge and skills in sustainable development, making them more competent and confident while broadening their opportunities for acting towards a healthy and productive life in harmony with nature and with concern for social values, gender equity and cultural diversity. This requires us to reorient education systems, policies and practices in order to empower everyone, young and old, to make decisions and act in culturally appropriate and locally relevant ways to redress the problems that threaten our common future.

4. NEEDS TO SUPPORT VISIONS OF EDUCATION SECTOR

Achieving the objectives of the ESD will be a long term process that will require expertise, time, energy and resources. ESD implementation will depend on the strength of stakeholder commitment and cooperation at local (sub-national), national, regional and international levels. The resources assembled by governments and stakeholders will strongly affect the success of national responses to the declared decade for education for sustainable development. In order to achieve vision in the education sector, it is also necessary to give assistance to this sector through non-formal learning.

Eco-school program development is recognized as particular school activities, but needs to be established, organized and supported by government [7]. Within CARDS EPA project Eco-school pilot project is researched that is recognized as a need for the future school activities in environmental public awareness development. Environmental awareness could be also developed through school competitions on environmental issues at the state level instead of recent particular practice.

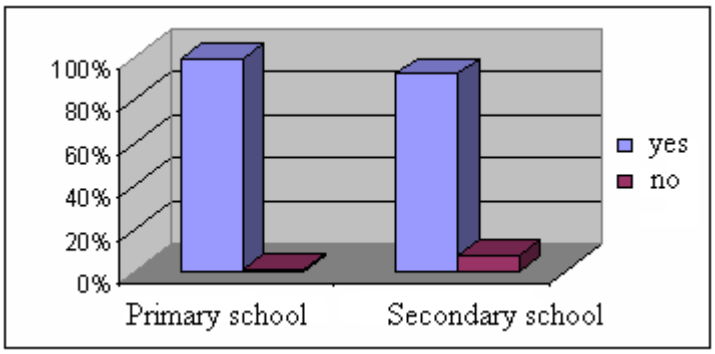

Figure 2. (Teachers' interest in additional training)

Teachers' interest in attending seminars and workshops on environmental issues is displayed on Figure 2. It is obvious that teachers have recognized their own needs for additional training and which presents the significant implementation role for the EU CARDS EPA Project.

5. CONCLUSION AND RECOMANDATIONS

In line with the principles behind the UNECE Strategy for Education for Sustainable Development, the education sector has a key interest in developing the activities related to environmental awareness through the curriculum and beyond. Issues of environment protection should be integrated into every subject in primary and secondary schooling within the framework of the subject's thematic environmental examples that could help develop environmental awareness. A lack of appropriate environmental educational material for different school grades with ideas, practical examples and experiences should be avoided by producing new ones that can be used by current and future teachers.

The focus of the reform at university level is the implementation of the Bologna Process and its Declaration as well as the Convention on the Recognition of Qualifications Concerning Higher Education in the European Region. There are also some initiatives regarding environmental education at university level such as interdisciplinary undergraduate and graduate programs to be developed in the field of environmental sciences [3].

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VOCATIONAL EDUCATION AND SUSTAINABLE DEVELOPMENT: EXPLORING

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Vocational Education and Sustainable Development: Exploring the Connections

In recent years several scholars have sought to connect general academic schooling with social and environmental enhancement (e.g., Bowers, 2001; Gruenewald, 2003; Orr, 1992; Smith, 1992; Smith & Williams, 1999; Sobel, 2004). These scholars critique modern education's penchant for a form of pedagogy that fosters individualism, passivity, competition, separation of school from community and mind from body, and increasingly, a single-minded training for future employment. They propose instead a pedagogy that grounds learning in a sense of place, supports curricular interdependency, critiques the cultural assumptions upon which modern industrial societies have been constructed, and offers experiential forms of learning that allow students to identify and improve their surroundings. This article joins this alternative pedagogy by offering vocationalism as a powerful strategy for developing an ethic of caring and providing practical skills needed to regenerate human and natural communities.

Vocationalism and its specific manifestation in schools in the form of vocational education programs have generally been defined and practiced as skill training for future employment. While I do not dismiss skill training as an important aspect of vocationalism, I believe we need a more generous interpretation of vocational theory and practice and we must couch it in terms of the personal (beyond the skill per se) and social service it can offer. This definition is akin to that offered by Norton Grubb and Marvin Lazerson (2004), who, following Dewey, argued that vocationalism is not just preparation for mere jobs but for occupations that enable a search for personal meaning, socioeconomic enhancement, and the pursuit of a fair and equitable Great Society. Historically, a lineage of notable writers has affirmed the practice of vocationalism along this vein. John Locke and Jean-Jacques Rousseau, followed by Heinrich Pestalozzi and Karl Marx, and later José Martí and John Dewey, to name just a few, all concurred in promoting vocationalism, and more specifically productive activities, as means to advance the personal and social maturation of individuals while boosting community prosperity (von Borstel, 1991). This cause has been taken up in the last two decades by observers of vocational education, who call for a critical pedagogy of work that analyzes critically with students their social and economic realities, and exposes them to more humane alternatives in these spheres (e.g., Gregson, 1996; Lakes, 1994; Lakes & Carter, 2004; Simon, Dippo, & Schenke, 1991). More recently, other scholars have advocated the importance of environmental protection and of using less harmful and more holistic forms of economic production (e.g., Anderson, 2003; Arenas 2003a; Lakes, 2000).

At the international policy level, a vital impetus to these efforts has been provided by the International Centre for Technical and Vocational Education and Training (UNEVOC), a branch of UNESCO that in recent years has examined and disseminated information about the connections between vocational education and sustainable development, that is, the belief that productive activities should move away from the single priority of economic growth and profit, and towards the integration of economic, social, and environmental goals (Arenas, 2005; UNESCO-UNEVOC, 2004).

Keeping this larger context in mind, I have divided this article into three sections. The first focuses on the relationship between vocationalism and social well-being. This part examines (a) the evolution of the ideas associated with vocationalism over the last two centuries, (b) the contributions of social theory in terms of demonstrating the participatory and contextual nature of learning, and (c) the connections between regular vocational programs and social justice. The second section studies the relationship between the economic system and environmental degradation, demonstrating that vocationalism has much to offer in terms of exploring alternative, more ecologically benign forms of economic production. The third section illustrates the application of these issues in a public secondary school in northern Colombia that has developed a remarkable vocational education program which deserves to be known internationally.

Vocationalism and Social Renewal

Historical Underpinnings

To understand the full potential that vocationalism could play today, it is useful to explore the ideas of earlier writers who connected manual labor to social change and justice. For the purposes of this brief historical introduction, I will focus on Jean-Jacques Rousseau, Karl Marx, and John Dewey, three influential writers who laid the foundation for understanding the intersection between vocationalism and community well-being. Rousseau was one of earliest Western pedagogues to provide a full-fledged exposition of the importance of promoting manual work among youth to reduce social prejudices and enhance egalitarianism (von Borstel, 1991). In the third book of his well-known *Émile,* published in 1762, he wrote about the need to strive for equality (Rousseau 1762/1966, p. 251):

A rich man doesn't have a bigger stomach than a poor man and doesn't digest better than him; the master doesn't have longer or stronger arms than his slave; a respected man is not more important than someone from the masses; and ultimately the needs of them all are the same, and so should be the means to satisfy them.

According to Rousseau, education should transmit to youth these "means to satisfy" their needs, in order to help break down the artificial barriers among social classes. Equally important, these skills bring people closer to nature, especially in the case of agriculture, which was, he claimed, "the most honest, the most useful, and the most noble" activity (1762/1966, p. 254), and to a lesser extent in other occupations such as smithery and masonry. Rousseau's ideas directly and indirectly influenced those of the Utopian socialists, who in turn influenced the work of Karl Marx. Although Marx's writings on education were scant, his ideas did influence the theory and practice of vocational education. Swayed by the writings and practice of Robert Owen, Marx wrote on the subject in *Capital*,

From the factory system budded, as Robert Owen has shown us in detail, the germ of the education of the future, an education that will, in the case of every child over a given age, combine productive labor with instruction and gymnastics, not only as one of the methods of adding to the efficiency of social production, but as the *only* method of producing fully developed human beings. (Marx, 1867/1999, chap. 15, sec. 9; italics added)

Marx's admiration for vocationalism was undergirded by his concept of praxis as a sociohistorical context for a materialist consciousness and ultimately for the making of history. One of our unique human qualities, he said, was the ability to use free, conscious activity to transform the physical world, not just the world of ideas (von Borstel, 1991, p. 34). Manual labor thus became a vital manifestation that gave character to the human species. As he explained in *Capital* (1867/1999, chap. 7, sec. 1), "Labour is, in the first place, a process in which both man and Nature participate, and in which man of his own accord starts, regulates, and controls the material re-actions between himself and Nature. . . . By thus acting on the external world and changing it, he at the same time changes his own nature."

The idea that people could transform themselves by using work to alter the social and natural world around them influenced John Dewey. While frequently critical of Marxism and state socialism, he nonetheless employed Marxian concepts in his analysis and, later in his career, defended democratic socialism as a viable alternative to the excesses of capitalism (Westbrook, 1991). Although Dewey did not privilege social class as an organizing category and principle, as Marx did, he did believe that the intimate connection that had existed between humans and their occupations in preindustrial societies had been lost under the capitalist mode of production. Moreover, like Marx, he saw work as a means of fulfilling one's humanness. As Dewey wrote in "School and Society" (1899/1976, p. 12), "The aim [of work] is not the economic value of the products, but the development of social power and insight."

Dewey also expanded on Marx's critique of the pernicious effects of the dualisms of modernity: the separation of mind from body, theory from practice, individuals from collectivity, and school from community. By placing occupations at the heart of the curriculum, he believed manual work could become a key mechanism for connecting schools to the larger social life of the community. As he wrote in *Democracy and Education*, published in 1916, "an occupation is the *only* thing that balances the distinctive capacity of an individual with his social service" (p. 308; italics added). It is important to note that Dewey's conception of occupational training was different from the narrow vocational education that reinforced and perpetuated class divisions. By occupations he did not mean particular jobs or even training for a particular kind of work. Rather, he understood occupations as life activities that struck a balance between the intellectual and practical facets of existence (Boisvert, 1998, p. 102). For instance, the goal of cooking instruction in school was not to prepare professional chefs, but more broadly to provide a socially useful activity into which to integrate academic content, such as biology, chemistry, and geography, and through which to bring together individual and collectivity.

Breaking down the artificial fragmentation within schools, and within modern life in general, was an essential aspect of democratic education. But this form of education could not be accomplished unless students were aware of the larger social and political dimensions that impinge on productive activity. Thus, a responsible education that passes on technical skills should "include instruction in the historic background of present conditions, training in science to give intelligence and initiative in dealing with material and agencies of production, and study of economics, civics, and politics, to bring the future worker in touch with the problems of the day and the various methods proposed for its improvement" (Dewey, 1916, p. 319).

In sum, for Dewey, democracy was the ideal state of community and could be realized only by a constant communion among all its members in transforming social and political realities. Occupations were an ideal strategy for reaching such communion.

Social Theory

A more contemporary look at the relationship between vocationalism and learning comes from the work of Jean Lave and Etienne Wenger (Lave & Wenger, 1991; Wenger, 1998). Having explored the intersection among social science, cognitive science, and philosophy, they argue that learning is situational and can take place only as part of a social process. Lave and Wenger reject the common definition (and practice) of learning as acquiring a discrete body of abstract knowledge within the individual mind and separate from its context. They argue that such separation violates the basic constitutive relationship among the individual, the process, and the world. In their words (Lave & Wenger, 1991, p. 29),

Learners inevitably participate in communities of practitioners and . . . the mastery of knowledge and skill requires newcomers to move toward full participation in the socio-cultural practices of a community. "Legitimate peripheral participation" provides a way to speak about the relations between newcomers and old-timers, and about activities, identities, artifacts, and communities of knowledge and practice. . . . [T]he meaning of learning is configured through the process of becoming a full participant in a socio-cultural practice. . . . This social process, includes, indeed it subsumes, the learning of knowledgeable skills.

Lave and Wenger (1991) demonstrate the interactive nature of learning through a series of ethnographic studies on apprenticeships (e.g., Yucatec midwives, navy quartermasters, meat-cutters). They emphasize that, although not all forms of apprenticeship are conducive to learning, apprenticeships can offer a radical and important contribution to learning. With their historically and culturally specific character, apprenticeships are ideal for showing the "indivisible character of learning and work practices" (1991, p. 61). When people initially join a community of practice, they learn at the periphery. As they become progressively more competent, they move closer to the center of the particular community. Learning thus is seen less as the acquisition of knowledge by individuals than as a process of social participation. We can derive three propositions from the work of Lave and Wenger:

- Learning takes place in an appropriate context.
- Learning is participatory in nature.
- Learning takes place in the students *and* in the process of social participation.

The research of social theorists supports vocational education as a means for revamping the individualized and decontextualized focus of traditional education. Vocationalism can place education in a real-life context that is meaningful, collective, and transformative. It can make learning not just a way of understanding the world but of being a part of it. Finally, it helps us to recognize that person and activity influence each other and that learning "concerns the whole person acting in the world" (Lave & Wenger, 1991, p. 49).

Social Justice

The praxis of bringing together youth labor and social responsibility is not new. Notable examples throughout the 20th century include the work of Celestin Freinet in France; efforts in the former Soviet Union led by Anton Makarenko; the Botswana Brigades (thanks to the work of Patrick van Rensburg); the Sarvodaya Shramadana Movement in Sri Lanka (founded by A. T. Ariyaratne); and the Schools to the Countryside in Cuba. Some other countries, mostly in northern Europe, also have a well-established tradition of combining work education with personal and communal well-being (CEDEFOP, 2004; Hickox & Lyon, 1998). Features common to all these examples include a focus on meaningful work, political empowerment, egalitarianism, cooperative learning, and reciprocal responsibility.

Despite these vital efforts, however, the main goal of vocational education in most countries today continues to be mere functional empowerment, that is, to instill in students the technical and human relations skills they need to fulfill their responsibilities in future employment. Although acquiring these skills is undoubtedly beneficial, they should not be obtained at the expense of other vital skills, such as the necessary language, conceptual knowledge, and political skills to awaken students' moral and civic responsibilities. As educators influenced by Marx, Dewey and Habermas have stated in their critical pedagogy of work education (Gregson, 1996; Grubb & Lazerson, 2004; Kincheloe, 1995; Lakes, 1994; Simon et al., 1991), that two key principles with which vocational education programs should be imbued are "emancipatory knowledge" (Habermas, 1971), and meaningful participation in all aspects of the design and production process.

In terms of the first principle, Jurgen Habermas (1971) distinguished between *technical knowledge* and *emancipatory knowledge.* Technical knowledge has to do with the world of facts and material things that can be verified by looking at documents or asking authorities. In contrast, emancipatory knowledge calls into question existing cultural traditions that conceal relations of domination. Emancipatory knowledge has the power to address oppressive forces in society. For educators, imparting emancipatory knowledge means presenting students with a language that helps them identify conditions in the world they live in and then transform them. As Henry Giroux (1992, p. 8) wrote, what students need is "a language that actively acknowledges and challenges those forms of pedagogical silencing which prevent us from becoming aware of and offended by the structures of oppression at work in both institutional and everyday life." Such commonly used concepts as employment, knowledge economy, economic productivity, and global competition all mask realities of oppression that must be uncovered. For instance, traditional vocationalism generally does not draw a distinction between jobs that help the community (e.g., working as a nurse) and those that contribute to its destruction (e.g., working for a weapons manufacturer) (Arenas, 2003b).

Thus, students must be able to dissect these concepts to understand the multiple meanings they harbor. Another key aspect of emancipatory knowledge is introducing students to a historical context that includes alternative economic systems. Given that most countries in the world today have embraced market capitalism and large-scale industrialization, students should be made aware of the genealogy of capitalism and industrialization, the transformation of work into labor, and the undermining of small and self-sufficient economies that were based on arts and crafts and small-scale agriculture. Equally important is to learn about the rise of unions and organized labor in the 19th century and the systematic attempts to reduce their power over the succeeding decades. (See Simon et al., 1991, chap. 9, for an example of how to introduce this history into the curriculum.) Finally, and more contemporarily, it is useful to explore the shift from national economies to transnational ones in which the production process is moved around the world in search of cheaper sources of labor.

The second principle is to offer students opportunities for meaningful and equal participation in the production process. Cooperative problem solving and decision making allow students to learn the value of teamwork. Consistent with social theory, learning occurs as a result of the group experience itself as well as in the individual. Active participation and dialogue allow students to experience more significant encounters that may lead to the creation of mutually dependent networks that challenge existing structures of power and domination. Student participation should not be restricted to the actual process of production but should also include input into what is produced. This allows students to envision new products and services that truly enhance community life.

Applying the preceding two principles can transform current practices of vocational education into a process of student empowerment that supports a democratic community. Without denying the importance of technical skills (which should be an essential aspect of a critical pedagogy), all students, but poor ones in particular, are at a distinct disadvantage when joining the workforce if they have not been exposed to a critical analysis of the social and political relations of production.

Vocationalism and Environmental Renewal

Of all educational programs, the one most closely associated with the economic system has historically been vocational education. Since John Locke's *Plan for Working-Schools for Poor Children,* originally published in 1696, vocational education has ostensibly been linked to national economic development through the promotion of good working habits and productive skills (von Borstel, 1991). Particularly in the 20th century, national ministries of education in both highly industrialized and less industrialized countries have implemented vocational and technical education, believing it to be an effective means of addressing the economic needs of low-income families. For the purposes of this section I will not dwell on the connections between vocationalism and the economic system hypothesized in human capital theory. Instead, I will analyze these connections in terms of how they affect the natural environment. This impact is seldom studied in conventional vocational programs, yet any form of production involves a transformation of natural resources that leaves an imprint on nature. Before exploring this relationship, it is useful to identify some of the links between the economic system and the environment.

Connecting the Economy and the Environment

Any form of economic production or service delivery involves an exchange of matter and energy, which inevitably carries with it an environmental impact, ranging from air pollution to biological impoverishment of the soil, erosion, water contamination, loss of flora and fauna, or the destruction of whole ecosystems (Costanza, Cumberland, Daly, Goodland, & Norgaard, 1997). Given that we live on a planet with limited natural resources, it stands to reason that the smaller the impact upon planetary resources of a production process, the greater the benefit to humans. With regard to the relationship between the environment and modes of production, two fundamental questions arise: First, how concerned should people be about a product's environmental impact? Second, what is the relationship between a product and quality of life? Neither of these questions is answered explicitly under free-market capitalism, the most prevalent economic system worldwide, but they are embedded within the assumptions of conventional economics.

The answer to the first question can be deduced by observing how conventional economics minimizes the importance of the environmental consequences of a production process. One typical assumption is that when a natural resource is so depleted that its continued exploitation becomes economically unfeasible, another resource can substitute for it. Julian Simon (1996), a proponent of this view, argued that natural resources "are not finite in any economic sense. . . . [I]f history is any guide, natural resources will progressively become less costly, *hence* less scarce, and will constitute a smaller proportion of our expenses in future years" (p. 6, italics added). Although most economists do not share Simon's optimistic view, they perhaps unwittingly support it by not considering the full environmental costs associated with economic transactions; or more precisely, they consider them by assuming that a combination of government regulations, market approaches, and technological innovations will provide the final solution. For instance, a company that pollutes more than a certain amount can be assessed higher taxes or a fine. This sends a signal to the market to come up with a technological solution (e.g., a filter that minimizes pollution) that the company would do well to invest in. Undoubtedly, these strategies *should* be a part of the solution, but a critical missing piece is a radical reformulation of society's moral and ethical guiding principles as to how we should live in harmony with nature while still satisfying our basic material needs (Daly, 1980).

Conventional economics answers the second question of the relationship between products and quality of life by assuming a principle of nonsatiation, namely, that rational humans always tend to want more, not less, of a commodity. College textbooks on economics repeat this mantra unquestioningly. Consider, for instance, how two popular textbooks discuss this basic assumption of consumer behavior. One states, "Scarcity exists simply because it is human nature for people to want to have more than they can have" (Ruffin & Gregory, 1990, p. 3). The other asserts, "Goods are assumed to be desirable. Consequently, consumers *always* prefer more of any good to less. In addition, consumers are never satisfied or satiated; more is always better, even if just a little better" (Pindyck & Rubinfeld, 2005, p. 66, italics added). Notice how both sets of authors ascribe to human nature an insatiable desire for material things. Advanced industrial technologies have enabled a relatively large percentage of the world's population to have access to common household goods at a modest price.

Even luxury items are seen as indispensable. Consider the following "wish list" taken from one of the economics textbooks (Ruffin & Gregory, 1990, p. 30): "One person's list of wants might include a luxury car for each day of the week, a 10-bedroom and a 7-bathroom home in the best part of town, a 15-room ski lodge in Colorado or in Switzerland, a full staff of 25 servants . . . the only limits to wants are time, imagination, and appetite."

How these wants affect the larger ecosystem appears to be of little consequence to these economists. It is assumed that in the name of civilization and progress, nature becomes a legitimate site for exploitation with little foresight as to the effects on present and future generations.

The Greening of Vocational Programs

Although social justice concerns have been gaining strength in vocational education programs, it is still rare to find programs and theoretical approaches at the secondary level that address environmental conservation and protection (for exceptions, see Anderson, 2003; Arenas, 2003a; Dippo, 1998; Lakes, 2000). An analysis of publications in English on vocational education from 2005 and 2006 finds (see, for example, Lauglo & MacLean, 2005; McGrath et al., 2006) that there are very few instances that highlight the importance of environmental protection or the relationship between vocationalism and environmental sustainability. Notwithstanding the failure to make this connection in the literature, there is an urgent need to offer environmental education to future engineers, mechanics, agronomists, industry technicians, architects, builders, carpenters, and cooks, to name just some of the more common vocations taught in schools today. Each of these occupations transforms raw materials and manufactured parts into a finished product. If teachers assist students in making connections between the production process and the environment, and add to their program's mission statement the importance of environmental renewal, these steps will go a long way toward increasing the environmental consciousness of future workers and managers alike. This sentiment was expressed at UNESCO's Second International Congress on Technical and Vocational Education, held in South Korea in 1999, the final document of which stated that "social and economic trends predicate the need for a new development paradigm which holds a culture of peace and environmentally sound sustainable development as its central features. Accordingly, the values, attitudes, policies and practices of TVE [Training and Vocational Education] must have their foundations in this paradigm" (UNESCO, 1999). The following four objectives could be addressed in vocational education programs:

1. Discuss with students environmental problems related to the production process and the end product of the vocational program. For example, if the program focuses on the training of automotive mechanics or engineers, teachers and students could discuss environmental problems caused by automobile use, such as air pollution from car exhaust, depletion of non-renewable resources such as oil, and lead contamination from car batteries. In an agricultural program, students could learn about the consequences of capital-intensive farming, such as erosion, deforestation, contamination of waterways, soil infertility, and reduction in biological diversity. In a construction program, students can learn about pollution generated by energy consumption, construction waste, and release of harmful chemicals from construction materials.

2. Implement (whenever feasible) environmentally friendly alternatives in the production process. Students in the automotive program could explore the use of fuels from renewable resources, gasoline-efficient engines, and non-lead batteries, as well as the recycling and reuse of solid waste from cars, particularly steel and aluminum components. The agriculture program might involve experimenting with labor-intensive, low-input farming methods, including the use of cover crops, crop rotation, and biological controls to enrich the soil and control weeds, harmful insects, and disease organisms. And students in construction programs can use energy-efficient building materials, such as aerated and insulated concrete block, cement mixed with fly ash (a waste product from coal-fired powered plants), and energy-saving cooling and heating equipment.
3. Use production processes that have value from a local, historical, or indigenous perspective. Focusing on community-based environmental knowledge is an important mechanism for ensuring the preservation of valuable traditions. It is very difficult to integrate community-based knowledge into modern production processes such as those in the automobile industry. Given that cars are an invention of the modern era, they defy any form of production other than capital-intensive mass assembly. In contrast, agriculture and construction do lend themselves to the systematic incorporation of non-commodified forms of knowledge. In the case of agriculture, most forms of organic farming are based on centuries-old traditions passed on from generation to generation within peasant communities. In the case of construction, the use of traditional techniques and materials (e.g., adobe or bamboo) that respect the surroundings can ensure the continuation of culturally significant and ecologically aware knowledge.
4. Discuss with students the role of consumerism in modern societies and the difference between wants and needs. As the preceding review of conventional economics showed, current patterns of mass consumption (particularly in highly industrialized societies) have a dumbfounding disregard for the well-being of social and environmental systems. Vocational programs are in a privileged position either to reinforce that disregard or to assist students to be conscientious producers and consumers in meeting their basic needs.

From Theory to Practice: A Vocational School in Northern Colombia

To illustrate the themes explored thus far, I present qualitative data from the Ecological School Tomás Herrera Cantillo, a public secondary school in the department (equivalent to a province) of Magdalena in northern Colombia. The descriptive data presented here were generated through field observations, extensive in-person interviews, document analysis, and telephone conversations collected between 1997 and 2000. The underlying motivation for my research was to present as a case study a vocational education program that having few material resources and serving a poor SES population could nonetheless exhibit a predominance of features that support social justice and environmental protection. The school presented here does not constitute a model implementation of the theoretical approach provided in the first two sections of this article. Instead, it serves to illustrate one way in which these theoretical insights can be enacted in an authentic setting. For specific details of the qualitative research methodology used at this school, and for an expanded treatment of the evidence, see Arenas (2003a).

The Setting

The school is located in Peñoncito, a small town of about 2,000 people where homes lack indoor plumbing, streets are unpaved, there is no health center, and there are few telephone lines. Fifteen minutes away by boat is the town of Mompóx, one of Colombia's colonial gems, and separating the two towns is the Magdalena River, Colombia's longest waterway. Two socio-environmental factors mark this geographic area: First, the northern region of Colombia, particularly the departments of Magdalena, Bolivar, Cordoba, Sucre, and Antioquia, has witnessed intermittent but protracted violence since the 1950s as a result of the struggle between left-wing guerrillas and the Colombian army, a struggle that reached new levels of violence with the emergence of right-wing paramilitary groups in the 1980s. In fact, the school itself was named after one of the founders' brother, who was assassinated in the 1980s. Second, the natural area around Peñoncito comprises one of the largest networks of cienagas in the country, the Momposina Depression, a succession of inland, freshwater marshes with a high degree of biodiversity. The Momposina Depression has been overexploited and degraded in recent decades through deforestation, conversion to croplands, expansion of cattle ranching, fishing with dynamite, and the effects of war. Community leaders are well aware of these factors and have hoped that the school can serve as a civic space where these problems can be aired in a constructive manner. A community leader told me, "We're not so naïve to believe that our school will solve the problem of violence in the region, but frankly it's the only neutral site that we have where we can try to come up with alternatives" (personal communication translated from Spanish, May 2000).

The school, Tomás Herrera Cantillo (hereafter Peñoncito, after the name of the town where it is located), is a poor, rural vocational institution with about 180 students and with grade levels from 6th to 11th (11th grade is the highest grade in Colombian secondary schools). From its founding in 1988, the school has been a continuous exercise in vocational activity. When a local landowner donated a hectare of barren land for the school grounds, administrators, teachers, parents, and students participated in the construction of some of the classrooms, following the local architectural style of comfortable bungalows with thatched roofs. The school community also planted dozens of trees that included more than 30 species of hardwood, fruit, medicinal, and ornamental species, creating lush vegetation throughout the campus. When I conducted this research, the beauty of the campus stood in sharp contrast to its lack of basic services. Heading the list of deficiencies was the absence of running water. The only source of water was an artesian well in the school compound that was inadequate to meet the needs of a school specializing in agriculture and stock-raising. Moreover, the school had no teachers' lounge, no cafeteria, at most one textbook per classroom, insufficient desks for all students, and only two makeshift toilets.

Peñoncito was initially conceived as a private community initiative to offer local children schooling beyond primary education, given that the closest secondary school was too far away for most local children to attend. The original teachers, all of whom were from the locality, had obtained their teaching certificates in other parts of Colombia and had returned "to be of use in the town that saw us grow," said the foreign language teacher (personal communication, May 2000). Since its inception, teachers and community leaders wanted a school that not only offered a secondary degree but, just as important, that followed a pedagogy of peace and environmental sensitivity.

Given that violence and environmental degradation have been widespread in the region, they felt that a school that focused on these issues could teach lessons of tolerance for difference, of resolving conflict without resorting to violence, and of protecting the region's natural heritage.

In the early 1990s, Peñoncito teachers and community leaders decided to convert the school into a public institution to take advantage of the intense decentralization process started by the Colombian Ministry of Education (MEN) and to ensure the long-term sustainability of the school, given that it was too onerous for local parents to pay for tuition and fees. The decentralization process granted more autonomy and curricular flexibility to public schools around the country (Hanson, 1995; PREAL, Fundación Corona, & Corpoeducación, 2003). Among the new initiatives sponsored by MEN was to have each school adopt an Institutional Educational Project (PEI) to serve as the pedagogical framework around which key school activities would center. Given that MEN encouraged schools to use the themes of peace, democracy, and environment in their PEIs, Peñoncito saw its socio-environmental efforts legitimated and decided to make them an integral part of its PEI.

In terms of academics, as measured by the scores from the ICFES examinations (tests that students generally take during the last year of secondary school), in 2004 Peñoncito was considered a low performing school (ICFES, 2004), a situation that has remained unchanged over the years. However, in the Magdalena department as a whole, 85% of all schools whose students took the ICFES exams were also ranked as low performing in 2003–2004 (MEN, 2004). In fact, Peñoncito's ICFES scores are very similar to those of the two other secondary schools in the municipality (Centro Educativo Artesanal José de la Luz Martínez and Colegio Nacionalizado de Bachillerato Lázaro Martínez Olier). In 2004, the average ICFES score for Peñoncito was 5.9 (of a possible 10 points), that for José de la Luz Martínez was also 5.9, and that for Lázaro Martínez Olier was 5.7 points (ICFES, 2004). In other words, in terms of academics Peñoncito falls within the norm for the department as a whole, which is important for the school given that it wants to maintain its alternative pedagogical system but without compromising its academic component. As the principal told me (personal communication, May 1997),

While our main focus is vocational, we still need to show results in the area of general education. We also want our students to go to college, if possible. If the scores are too low, they won't be able to do so. By the same token, we probably won't be able to increase those scores too much in part because of lack of resources, but also because to do so we probably would have to sacrifice the vocational component of the school, and that we don't want to do.

The Vocational Program

The curriculum of the school is divided into vocational projects focused on agriculture, stock raising, and fish farming. There is one project per grade level, and teachers and students ensure its sustainability. The vocational program consists of the following activities:

6th grade:	Gardening focused on medicinal plants
7th grade:	Gardening and rabbit-raising
8th grade:	Maintaining a greenhouse and offering veterinary services
9th grade:	Producing vermiculture and compost
10th grade:	Practicing aquaculture
11th grade:	Practicing aquaculture

The entire vocational program follows practices of organic agriculture and husbandry, and the projects are designed to be interdependent: The organic waste from the orchard and greenhouse is used in rabbit-raising, vermiculture, and aquaculture; the compost from vermiculture is used in the garden; and the cycle repeats itself. The programs teach children valuable practical and entrepreneurial skills that they can use to help their families improve socioeconomically.

Each vocational project exemplifies a "community of practice" (Lave and Wenger, 1991; Wenger, 1998). At each grade level students start a new form of production (or a new aspect of the production, in the case of aquaculture) at the periphery, and as they become better versed in the various aspects of production, the teacher gives them more responsibilities and teaches them more complex tasks. (In some cases, students have used the skills and knowledge acquired at school to start their own independent businesses.) All of the activities are contextual, in that they take place in a real setting, and they are inherently participatory because, although the projects are small in scale, they are large enough to require the participation of several students in order to succeed. Given that the region's main economic sector is farming and livestock, students gain a better understanding of their social reality and have inevitably transformed themselves through the actions of doing and learning. As an 11th grader said, "The projects have allowed me to better understand my parents and the difficulties they have endured to support us. I can now even see that I have the power to create new and important things" (personal communication, May 1997).

Social Renewal in Practice

Comparing the theory of a critical pedagogy of work with Peñoncito's vocational program reveals many parallels. The school's commitment to social well-being in general and social justice in particular starts with its mission statement and its three overall themes: democracy, environmental education, and sex education (to curb the high teen pregnancy rate in the region). Regarding the issue of violence, the mission statement reads in part: "[The school] seeks to form citizens capable of defending human rights and who can foster democratic processes of citizen participation and self-generated projects that minimize violence . . . and intolerance toward others." A parallel mission of the school is to seek in small ways to improve the socio-economic standing of local families, as in the case of the 7th grade gardening project.

To diversify their diet, students learn at school to grow vegetables that locals generally do not eat (e.g., spinach, radishes, green beans, Brussels sprouts), and try out recipes based on the produce. Children then have to grow them in their home garden (most homes have backyard vegetable gardens) in the hope that these vegetables will become an integral part of the family's diet. As one parent told me, "One of the vegetables my daughter has learned to grow, the one that has really stayed in the family, is spinach . . . my wife loves it" (personal communication, May 1997). It should be noted that the school and the community have been tightly integrated since the school's founding. Parents and teachers together petitioned the Colombian Ministry of Education to create the school, and parents participated in the building of classrooms and general improvement of the campus. This has allowed parents to develop a sense of belonging toward the school and a sense of trust toward the teachers and staff. As a result, parents are by and large receptive to new ideas emanating from the school if they see a practical application at home.

A political battle that staff and students have undertaken since the school's creation is related to public accountability and transparency. In a region dominated by political graft, including the buying of votes, the school has shaken the political terrain by organizing public forums where they have invited local politicians and demanded from them accountability for their actions and campaign promises. Politicians have not appreciated these calls for increased transparency and have found different strategies for sabotaging the school, including withholding funds for a much-needed water supply system. Nonetheless, through these forums teachers have provided students and parents with a language, set of practices, and sense of empowerment to challenge existing oppressive structures.

Another aspect of this critical pedagogy of work is the highly participatory nature of the projects, which is manifested in two main ways: First, students participate in all aspects of the production, and teachers create a system of rotation to ensure that all students master the production process. "It's very important that all children, boys and girls, participate in every stage," said the teacher in charge of the organic garden. "Sometimes girls want to do less because of the hard physical labor, but I tell them that in order to obtain a high grade, they have to work as hard as the boys" (personal communication, October 2000). The aquaculture teacher (who teaches the upper two grades) encountered this issue as well. "That's a big problem we faced at first. Girls didn't want to handle the fish or get into the ponds. Over the years we have more or less solved the problem because younger students see that we treat everyone equally here" (personal communication, October 2000). Fishing is a notable example of a gendered activity historically dominated by males, and the school has been instrumental in opening up opportunities for females. A 12th grade female student said (personal communication, May 2000),

My dad and my brothers always went fishing on their own and didn't take me with them. Now that I know about aquaculture thanks to Professor Tamaris [the aquaculture teacher] my dad asks me to come along, something that had never happened before. I still have a lot to learn [about fishing] but now I feel much closer to my dad because of that.

A second form of participation is in the sharing of profits or goods produced. During the time of my research, the only project generating a profit was the 6th grade medicinal garden. The profits derived from selling twigs and branches of the medicinal plants to inhabitants of Peñoncito and nearby towns. Many of these plants are rare and difficult to find, and thus locals place a high value on them. Students not only sold the plants, but also provided information on their medicinal use to buyers. By common agreement, the profits were divided equally among the students, the school, and the teacher. It was decided that the teacher should receive a share of the profits because she has to put in many hours beyond her normal schedule. With regard to the other projects, any products they generate are shared among the students or used for the luncheons that the school organizes regularly for students and parents. The idea of sharing profits has come as a surprise to many parents; in the region there is little in the way of a cooperative movement because income is generally generated through work as peons on larger farms or through small landholdings that the family may have. So teachers, both in the social science classes and in parent meetings, have talked about alternative labor arrangements such as cooperatives and labor unions, a highly risky proposition in a region historically dominated by landowner-peon relationships where the peasant has had no bargaining power and where any slightly socialistic idea has been met with extreme violence. Nonetheless, many parents have welcomed these ideas with a healthy sense of curiosity. As one father asked in a meeting led by teachers (personal communication, May 1998),

[In a cooperative] how do they make sure that the lazy ones don't take advantage of the hard-working students? How do they distribute the earnings in a fair way? If there's no boss and someone makes a mistake, who will make sure that they correct the problem? How can we create a union if there has never been one here?

Teachers obviously did not have answers to all these questions, but explained that they employed the regular academic disciplines (particularly social studies) to provide a larger historical framework to help explain social and environmental problems. For example, given the agricultural, husbandry, and fish farming focus of the school, students study the green revolution and its social and environmental effects in the country. They also study the reasons why Colombia has one of the highest arable land concentrations in the hemisphere and the consequences of this for its rural population—0.4% of landowners own more than 60% of the registered rural land in the country (El Tiempo, 2004). In addition, they study and practice viable alternatives to the agro-industrial mode of production through the various projects that dispense with synthetic inputs and other capital-intensive strategies. Thus, in the best Habermasian tradition, students, parents, and teachers acquire emancipatory knowledge that helps them envision new realities and possibilities.

Many students, however, do not want to follow in their parents' footsteps by becoming farmers or fishers. They want instead to go to a large city like Barranquilla and study engineering, nursing, accounting, architecture, fashion, or other professions. The teachers encourage the pursuit of higher education, but they always remind students of the importance of giving back to the community, an example set by the school founders. The school has no solid data on what happens to students after graduation, thus most of the available information is based on word of mouth; according to the school's secretary, about half of the graduates enroll in a higher education institution, and of those only about 20 percent study agronomy or a related field. Nonetheless, when I asked several 11th graders what they wanted to study after

high school, even those who mentioned they wanted to pursue an occupation unrelated to Peñoncito's focus said they appreciated the school's curriculum. As an 11th grader pointed out (personal communication, May 1998),

I want to be an architect, and although growing food is not going to be necessary for my career, I do like to know that I can rely on my hands to grow food. I think that's important, and who knows, maybe one day I can do both. … I know many people in the city don't know how to grow their own vegetables, so not only would I be able to speak their language [as an architect] but I would also be able to do something that they can't.

One important aspect of this statement and of the career choices of many students is that Peñoncito suffers from a problem common among traditional rural schools. As has been recognized since the 1960s (Foster, 1963), rural schools have not been successful in stemming the rural-to-urban migratory flow or in encouraging students to pursue postsecondary degrees related to agriculture and livestock production. The real and perceived social and monetary benefits of living in a large city and possessing a college degree far outweigh the dim occupational prospects and less glamorous lifestyle of rural areas. Nonetheless, teachers encourage students to return to the village after obtaining their degrees, knowing well that unless returnees work for the government, have their own parcels of land, or open up their own businesses, prospects for employment in Peñoncito are somber. Teachers feel that their ultimate responsibility is to provide not employment (because this is outside of their control) but a critical perspective on life, along with some valuable skills that could provide a modicum of independence from the incertitude of the market economy. As a teacher said, "Our students have a vision of life that many youth their age don't have. Will that help them get good jobs? I don't know. But I do know, and so far our graduates have demonstrated, that they can help make Colombia a better place" (personal communication, May 2000).

Environmental Renewal in Practice

The school's mission statement reflects not only its social orientation but also its environmental focus: "[The school] seeks in the medium and long term to foster the protection, love, and defense of natural resources." Peñoncito's anthem reinforces this focus, as one of the verses reads, "With ecological vocation a futuristic vision will be forged for the country." One of the clearest examples of this orientation is that all the projects use organic and ecological methods of production. For instance, the school rejects the use of synthetic pesticides or fertilizers, and instead relies on several biological methods to maintain a healthy soil, including compost, green manure, natural predator-prey relationships, and crop rotation.

As part of its environmental goal, each project is conceived as a demonstration site for local producers in the region. A notable example is the aquaculture project, the rearing of aquatic organisms. Although there are 11 large marshes in the region, fishing is one of the weakest economic sectors. To counter this deficiency, the school decided to focus on aquaculture in the upper two grades. The goals of the aquaculture project were to awaken an entrepreneurial spirit among students as to the potential for fish farming and also to enhance the diet of locals, most of whom do not eat fish (an inexpensive source of much-needed protein) on a regular basis. The downside of the aquaculture project so far has been the difficulty in setting up an adequate facility. For instance, in 1998 the acidity in the pond water was too high for the tilapias, which prevented their growing and breeding.

According to the teacher in charge, "To prevent this in the future, we would have to do a lot of scientific experimentation, which my students are capable of doing, but we have to use a lab in Mompóx that is inconvenient because it's far away and not always available" (personal communication, June 1998; the school does not have its own lab and must use one in a different school). To compensate for the technical problems related to aquaculture and to capitalize on the large number of marshes in the region, the aquaculture teacher decided to place small underwater cages in the marshes to capture bigger fish. This dual strategy of using ponds in the school campus and cages in the marshes has allowed students to experiment with two different methods of fish harvesting. The idea of using small cages was completely innovative for the region and captured the imagination of fishermen, a few of whom decided to put it into practice with modest success. Another innovative practice has been to offer workshops at the school to encourage fishermen to stop using dynamite for fishing—a local custom with highly damaging effects on the overall fish population—and to teach them more sustainable ecological practices, such as making nets with a large mesh to ensure that only the bigger fish are caught. In an interview one of the local fishermen said, "Teacher Tamaris [the aquaculture teacher] and the students are very kind. They have taught us good techniques to protect the fish while still being able to feed our families" (personal communication, May 1998). The close relationship that has been developed between the school, students, and community members has helped students to feel that they are socially useful. An 11th grader told me (personal communication, May 1998),

Last year [as a 10th grader] when we went with the teacher to work with the fishermen I was nervous. There was nothing I could offer. Now, I know about the importance of the cages and how to make them and install them. A few of the fishermen have warmed up to the idea. I feel this is great because now I feel I can help others.

Along with promoting solidarity among community stakeholders and environmentally sustainable forms of production, the school has been at the forefront of legitimating oral, non-commodified forms of knowledge related to the projects. In the case of fish harvesting, community elders were invited to the school to tell stories about fishing in their youth. In this way students learned that decades ago one could find in the marshes *bagres* (a type of catfish) that measured one meter in length, whereas today the longest measures only 40 centimeters. Students also learned about the *coromorán,* a native fish considered a local delicacy that became extinct with the introduction of non-native species such as tilapia.

Another illustration of the valuing of oral knowledge as a community asset occurred in the 6th grade medicinal garden project. The teacher and students interviewed local mothers and grandmothers to find out about plants that they employ (or used to employ) to cure common ailments. After compiling the lists from these interviews and comparing them to botanical books, they identified about 50 species of plants with medicinal value and planted at least one specimen of each. In this way students learned about such rare plants as *anamu,* useful against the common cold and fever; *malambo,* for getting rid of parasites; and *tua tua,* an excellent antidote against swelling. The medicinal garden thus became extremely important in revitalizing a form of traditional environmental knowledge that is in danger of being lost. In one occasion I asked an 8th grader (who had gone through the medicinal garden project two years earlier) if he still remembered the lessons from the botanical garden.

We went to the garden, where he proceeded to correctly name about 20 of the plants with their medicinal value. To the question of whether he actually applied such knowledge, he replied (personal communication, May 1998),

Well, probably not as much as I should [he said with a shy voice]. But I do know more than I used to. The other day my grandmother had a cold and I told her to make a tea of *anamu.* So I went out, got some leaves, and my mom made the tea for her. She drank it all and said afterwards that she was feeling much better.

A final component of the school's environmental philosophy is class discussions and associated activities (mostly in the social science courses but on occasion as part of the productive project itself) on the relationship between industrial societies, mass consumption, and the natural environment. According to the social science teacher, the discussions center around the importance of producing goods that satisfy basic needs (i.e., food, shelter, clothing), entail an environmentally friendly production process, and are long lasting. In one of my visits to the school a teacher was teaching young students how to make purses out of foil candy wraps. The wraps had been collected from the students' own candy consumption and from trashcans. The beautiful and durable purses were then sold to teachers and in the community. While the students were making the purses, the teacher told them about the importance of reusing materials rather than throwing them away, and a lively discussion ensued about the many things that people in the community reuse on a regular basis without being aware of the resulting vital environmental (and economic) benefit.

In sum, teachers from the various disciplines make a conscious effort to pass on to students knowledge, skills, and sensitivity that make them more self-reliant; to encourage them to respect and rescue environmentally friendly local traditions; to incorporate new practices that have a low impact on the environment; and to develop a sense of appreciation and care toward the natural environment. In relation to the attachment to nature that Peñoncito tries to transmit to its students through its productive projects and other activities, a teacher told me (personal communication, October 2000),

In general the longer you live in the city, the greater the separation between yourself and nature. That's inevitable. It's not felt as strongly by the first generation, but definitely you do [see it] by the second, third, and fourth generation of living in the city. People become so busy in their own lives that they don't have time to spend with friends and family, or just take a stroll in the countryside. And I'm not trying to romanticize the countryside. We have lots of problems here, I mean, even taking a hike for us has now become a problem because of the danger from the guerrillas or the paracos [paramilitaries]. . . but I've no doubt that we have a closeness to nature that's pretty much absent in the city.

Conclusion

In writing this article I had three goals: First, to defend vocational education as a vital strategy for challenging many of the dualisms present in contemporary education. A long series of writers has defended vocational education as an intrinsic component of any responsible education. Some, like Marx and Dewey, even believed that it was the *most* essential pedagogical strategy. Productive work is "the only method of producing fully developed human beings," Marx once remarked (1867/1999, chap. 15, sec. 9). And Dewey wrote that education through occupations "combines within itself more of the factors conducive to learning than any other method" (1916, p. 309). Despite important attempts by several governments and groups to revitalize vocational education and make it an integral component of the educational system for *all* students, vocationalism still holds the unfulfilled promise of making education a transformative endeavor that brings together body and mind in one indissoluble experience.

Second, I set forth a critical pedagogy of work education as an important means to enhance vocationalism. Today, vocational education is overwhelmingly subordinated to the economic imperatives of the nation-state and increasingly to the logic of transnational economics rather than to the moral and ethical dimensions of education. Teaching any student, but particularly poor ones, to fit blindly into industrial and postindustrial capitalism is akin to ensuring that exploitation and unfair labor practices continue unabated. A critical pedagogy of work education offers a theoretical approach that acknowledges the significance of acquiring solid technical skills while stressing the importance of engaging students in an emancipatory dialogue in which they can talk freely about expectations, fears, and frustrations regarding the worlds of education and work. It also introduces students to the history of work and labor, to the struggles of unions and other worker movements, and to alternative systems of economic development, while allowing them to work collectively, to learn from each other, and to assume positions of leadership.

Third, and this is the area where vocational education has made the fewest inroads, I argue that practitioners ought to adopt realistic strategies that make their production processes more environmentally friendly. International organizations have called on businesses worldwide to implement as soon as possible environmentally sustainable practices; for example, ISO 14000 encourages businesses to minimize the harmful environmental effects of their activities and to improve their environmental performance. In terms of education, the United Nations gave environmental sustainability a forceful push when it named 2005–2014 as the Decade of Education for Sustainable Development (UNESCO-UNEVOC, 2004). This initiative may encourage schools and ministries of education worldwide to pay closer attention to the possibilities for vocational education to promote social well-being in the context of protecting and conserving the natural environment.

Despite the important work being done by UNESCO-UNEVOC, theory and practice that connect social equity and environmental integrity with economic vitality are still a distant reality. A case in point is provided by the official journal of the International Vocational Education and Training Association, one of the most important academic communities of vocational educators, which between 2000 and 2005 published a total of 70 articles, of which only two dealt—and even these only marginally—with the issue of sustainability. Therefore, developing theoretical models that address all three of these areas is one of the key challenges educators face today if vocational education programs are to serve the needs of present *and* future generations. The school portrayed in this essay provides only one example of the ways in which social well-being and environmental sustainability can be realized. Thus, Peñoncito should not be viewed as a prototype to be carbon copied elsewhere, because it developed a set of practices that responded directly to the unique historical, cultural, and geographic features of this Colombian region. Nonetheless, schools located in urban or suburban areas, focused on capital-intensive forms of vocationalism, or situated in highly industrialized countries can still benefit from the lessons derived from this school, and equally important, use them as inspiration for the changes they themselves want to implement.

Comparatively speaking, few existing vocational programs follow the social and environmental principles outlined in this article. Even the Colombian public school I described has deficiencies—for an extensive treatment, see Arenas (2003a)—that administrators and teachers are seeking to correct. Still, schools like this one demonstrate that even with few material resources it is possible to make vocational education an invaluable asset for children and communities. As a 7th grader said after working in the organic garden, "When I ate one of the carrots we had grown at school, it tasted like the best movie I'd ever seen" (personal communication, June 1997).

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ENVIRONMENTAL AWARNESS, EDUCATION AND LIFE LEARNING

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Environmental awareness is a concept which has to be taught from the preschool to the graduation period. In addition to the formal education methods, there are many other ways to make students conscious about the environment. Workshops dealing with environmental problems are one of the most popular activities especially in design schools.

The workshops that were organized between 17th and 21st of April, 2006 in Girne American University were one of the informal educational procedures and had been participated by all levels of students from Architecture, Interior Design and Graphic Design Departments.
In addition to more than 100 GAU students; 66 students and 7 lecturers from Osman Gazi and Eskisehir Anatolia Universities of Turkey joined the workshops in GAU Campus.

The main theme of the workshops was on environmental awareness and main topic was "design with recycled materials". The main aim was creating new ideas and products by using waste materials.

There were mainly seven groups directed by GAU academic staff and the lecturers from the two Turkish Universities. They were "Code for 4 R Workshop" "Texture from Nature Workshop" "Noah's Arc", "Green Dress Code Workshop", "Reinvention of Refuse for Multi-functional Design Workshop", "Mud Brick Shelter Workshop" and "Press Workshop".

One of these workshops was **"CODE FOR 4 R"** which means "**R**ecycle-**R**euse-**R**edesign-**R**ebuild". This workshop explored the integration and use of waste materials in architectural design. Its main aim was to make the design students aware of their environments by considering the reuse and reinvention of large variety of waste materials. It was also an opportunity to learn, to experience the potential of any material and use it in their creative design approaches.

With these aims, it was asked participants to design architectural landscape elements such as lamp post, litter bin, sign, flower pots, sculptures, seating units and built a model in 1/1 scale by using recycled materials of any kind. They were responsible to select the right place for displaying them in the courtyard. Another important requirement was to keep their working space clean, safe and care its aesthetic value.

The group which was moderated by Devrim YÜCEL BESİM had 9 participants; 8 students from Architecture and Interior Design Department of Girne American University, one student from Architecture Department of Osman Gazi University, Eskişehir.

After having a brief explanation of workshops, students started to produce their proposals. First, they made conceptual sketches in studio and discussed about their design concepts for one day.

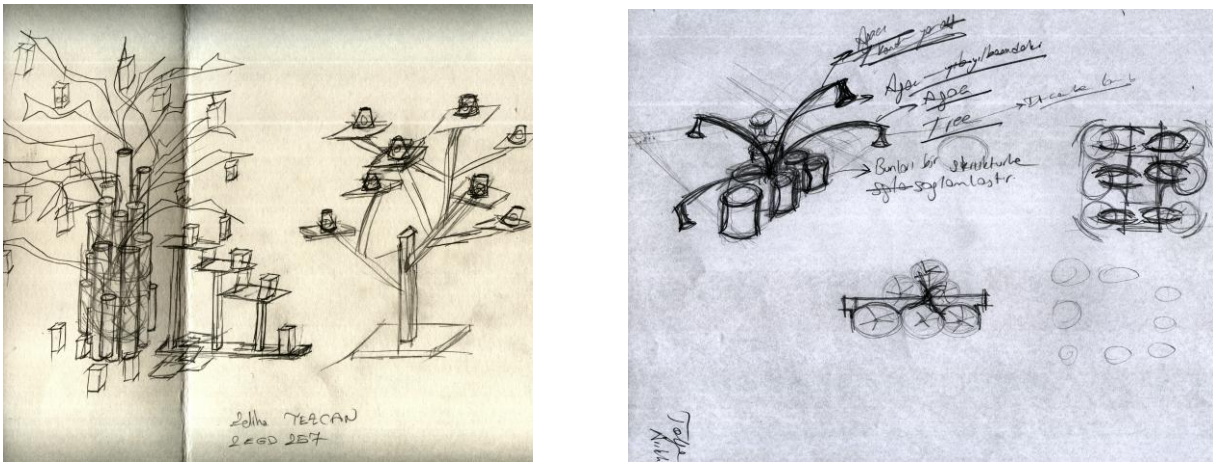

Figure 1: Some Conceptual Sketches of the Participants

Then they listed the materials they need and started to collect the waste materials from the nature, close surrounding, construction sites, industry region and garbage of the city such as water cans, glasses, bottles, fabrics, metal sheets, wooden pieces, etc. At that step, they realized that there are several materials with more potential than they imagined before.

After the second day, they started to build their model firstly in studio. After cleaning their working space, they moved them to the outside and thought about the relation between their product and the closed environment which is a background for exhibition. Finally, they supported their models to keep them standing safely.

Figure 2: During the production process in studios

Students worked individually or in group of two for three days during the production process. They produced six different items which were a sculpture: *"Wishing Tree*" by Zeliha Tezcan, a table: *Melody of the Empty Bottles*" by Bora Üzümcü, a chair: *"Sultan's Chair*" by Ersin Çağlayan, a flower pot: *"Flower Can*" by Gökçe Kocagöz and Sinem Çelik, a sign: *"Different Levels"* by Hamza Arif and Mirunalan Guhanesan and a seating unit: *"Butterfly"* by Tolga Arıklı and Andy Iman Monfared.

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Figure 3: Students concentrated on the production process with waste materials

During the production process, it is realized that most of the students changed and developed their proposal according to the nature of the materials that they collected. They used the waste materials as much as possible while extra materials such as glue, rope, nails, spray paint in minimum way just to reach safe and aesthetic result.

Figure 4: 4R Group's Products: A flower pot and a sculpture

At the end of the workshops, the products were exhibited on the courtyard of Girne American University for one week. In addition to the works of Group 4R, all of the workshops which are mainly interested with recycled material brought their products together and showed on a catwalk with a final display facility.

Figure 5: Some Examples of the Other Workshops' Products

The students declared that they enjoyed the process very much in the questionnaires that the moderated prepared at the end. They had opportunity to learn in a different way about both the awareness of their environment and the design process. It can be said that the "**CODE FOR 4 R"** (**R**ecycle-**R**euse-**R**edesign-**R**ebuild) workshop had two different points as result:

Participants found out the potential of waste materials in their surrounding. They learned to change them into "recycle material" by reuse, redesign and rebuild processes. They had experience to choose the material, to understand its nature and use its potential in a creative way.

They realized how much waste material was produced during their production process according to their design which they should care about. They understood that they as the leaders of environmental designers are responsible to survive and sustain their environment with their products.

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UNIVERSITY STUDENTS' VIEWS ABOUT A COURSE ON THE *SUSTAINABLE DEVELOPMENT*: RESULTS OF A NEED ANALYSIS STUDY

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The present study aims to investigate the needs of university students on becoming aware of environmental problems and sustainability concept during an undergraduate course. The needs assessment (NA) study including three steps was realized with 85 undergraduate students in the Middle East Technical University (Turkey), as a first part of course evaluation project. In order to determine participants' needs as far as the concept of sustainability is concerned, the needs assessment instrument was used. Results revealed that, students believe in that education is the fundamental stage to constitute awareness on sustainability. As reported by the students, the use of methods of discussion ($\overline{X}$ = 4.30) and brain storming ($\overline{X}$ = 3.86) are the best methods to be used for developing awareness on sustainable development. They also indicated that computer and projection machines ($\overline{X}$ = 4.5), visual materials ($\overline{X}$ = 4.25), video ($\overline{X}$ = 3.89), television ($\overline{X}$ = 3.62), research materials ($\overline{X}$ = 3.55), OHP ($\overline{X}$ = 3.53) and tape-recorder ($\overline{X}$ = 3.17) are important instructional materials to be used for such a course. Almost all the students believed that taking this course is beneficial for them both to integrate the concept to their own profession and to develop their awareness, sensitivity and consciousness about their responsibilities toward protecting environmental resources for future generations.

Key Words: *Sustainable development, Education for sustainability, needs assessment*

INTRODUCTION

Education for sustainability is an evolving concept that encourages people to think about their responsibilities for creating a sustainable future. The roots of this concept go back to 1960s-1970s when the environmental educations movements got impetus. The evolution of the environmental education in the 80's developed around so called, "*green environment*". And with the renewed efforts to reconcile economy with environment under *Agenda 21*, new points were introduced: the reorientation of education towards sustainability, particular emphasis on public awareness and the role of training of young people. There are many meetings and research done so far to make achievement in sustainability for higher education. Thus, in order to better understand the reflections of this concept on higher education and for better understanding the framework and trends of sustainability in higher education, it may be useful to look at the declarations prepared so far. They are summarized chronologically in the Table 1. Most of them define the term sustainable development and its relation with the environment. After Thessaloniki Declaration (UNESCO, 1997), *Earth Charter* in 2000 on the principles and aspiration on sustainable development, *Lüneburg Declaration* in 2001 on the higher education for sustainable development and *Ubuntu Declaration* in 2002 on the education and science and technology for sustainable development were realized for the integration of sustainable development concept to education (dé Rebello, D., 2003).

The universities have been challenged to adopt the principles of these declarations and signed agreements to be sustainable (Wright, T.S.A., 2002). Some of them have integrated these principles into their policies.

Table 1. Chronological order of the declarations associated with sustainability in higher education (taken from Wright, T.S.A., 2002)

Year	Declaration
1972	The Stockholm declaration on the Human environment
1977	Tbilisi Declaration
1990	The Talloires Declaration
1991	The Halifax Declaration
1992	Report of the United Nations Conference on Environment and Development Chapter 36: Promoting Education, Public Awareness and Training
1993	The Kyoto Declaration
1993	Swansea Declaration
1994	CRE Copernicus Charter
1997	Declaration of Thessaloniki

As indicated by Herremans and Reid (2002), for example, in order to make the students understand the concept of sustainability and stewardship, models and processes must be created during the instruction that will help construct a bridge between real world and the classroom. They represent a model including economic, social and environmental values. The overlapping area of these three values addresses the concept of sustainable development. Furthermore, in 2002, UNESCO has dedicated 2005-2014 UN Decade Education for Sustainable Development, for the international implementation of the concept throughout world (UNESCO-CONNECT, 2005).

Developing university students' awareness on sustainability is a complex process. Incorporating the sustainability into university policy, curriculum (de Ciurana & Filho, 2006) and decisions (Moore, 2005) will provide chances to become aware of the concept. Integrating the concept into the university curriculum, which plays a great role on shaping the society, will orient the society toward a sustainable life. It will help university students to look at their profession with a wider angle and help them to integrate the concept with their own subject (de Ciurana & Filho, 2006). In order to reach the desired and successful outcome; that is, developing awareness on sustainability, it should be basically answered to "Where are we now?", "Where do we want to be?" and "How will we get there". These questions were identified by Cook (2005) as three basic points of learning needs assessment process. Need indicates the gap between current (present) state and desired state. It also refers to what is required and/or desired to fill the discrepancy (Witkin and Altschuld, 1995). Sometimes, it refers to determining problems coming out and pertaining. In the professional educational literature, the researchers tend to categorize the needs assessment under the broader heading of program evaluation (Stufflebeam, McCormick, Brinkerhoff, Nelson, 1984). Conducting needs assessment with the target group assists in determining what needs exist and how these needs should be addressed.

Determining needs and improving or/and developing the instruction and curriculum based on these emerged needs enable learners to be more responsible for their learning process. If the needs of students are more integrated into the course implementation, the learning of the main concepts will be more meaningful and the students will be more willing to attend course and learn the concepts. Therefore, in order to make the instruction more effective and more efficient, learners' needs must be considered.

The existing literature indicated that there is no such study in Turkey dealing with needs and expectations of students in higher education in the area of education for sustainable development. The ones that may be related with the subject deals with investigate the needs and expectations of graduate students who would become faculty staff in the future (Akpınar and Paykoc, 2004) and with the current views and expectations of undergraduate students in terms of instructional strategies used during the lectures, facilities offered, and faculty staff (Pınar, Tan, Erdoğan, & Mısırlı, 2005).

Purpose of the study

The purpose of the present study is to make an assessment on the needs of the university students about how to be aware of environmental problems and sustainable development concept by an undergraduate course. Their needs on the targets of the course, instructional methods, instructional materials and evaluation methods were explored during the needs assessment procedure.

METHOD

The Course: "*Education and Awareness for Sustainability*"

The course titled "Education and Awareness for Sustainability" has been offered for six semesters by the Department of Elementary Education in the Faculty of Education – Middle East Technical University (Ankara-Turkey). It is an elective course and available to all students in the university. The aim of the course is to develop environmental awareness and sensitivity among undergraduate students. As indicated in the course syllabus, the main goals of the course are to; (1) *Help the learner to understand how daily life and work can be adopted to improve the environment*, (2) *Acquire awareness and sensitivity to the total environment*, (3) *Acquire social values, strong feelings of concern for the environment and motivation for actively participating in its protection and improvement*, (4) *Acquire a personal view of general and global environmental issues, and* (5) *Ensure that, students understand that they are part of the natural circle*

Sample

Eighty five undergraduate students taking the course in the 2005-2006 fall semester entitled *"Education and Awareness for Sustainability"* were participated the study. The characteristics of the participants are summarized in Table 2.

Table 2. Participants

	Number of sudents			
Faculty	Male	Female	Total no of students	%
Faculty of Education	16	52	68	80
Faculty of Engineering	8	5	13	15
Faculty of Economic and Administrative Sciences	2	2	4	5
Total	26	59	85	100

As shown in the above table, the students have various backgrounds. Eighty percent of the participants were comprised by the students of Faculty of Education. Among them, 27 of them were from Elementary Mathematics Education (EME), 18 of them were from Elementary Science Education (ESE), 8 of them were from Foreign Language Education (FLE), 6 of them were from Early Childhood Education (ECE), 4 of them were from Chemistry Education (ChEd.), 3 were from Physics Education (PhEd) and 1 from Computer Education Departments. Among the students from the Faculty of Economic and Administrative Sciences, 2 were from Business Administration (BA), and other 2 were from Political Science and Public Administration Department. Among Faculty of Engineering students, on the other hand, 7 were from Geology Engineering (GeoE), 2 were from Mechanical Engineering (ME), 2 were from Food Engineering (FE), 1 was from Electric Electronics Engineering (EE) and 1 was from Mining Engineering departments.

Instrument

The needs assessment (NA) questionnaire used to investigate undergraduate students' needs, expectations and pre-knowledge about the course titled *"Education and Awareness for Sustainability"* was used as an instrument for data collection. The instrument was developed by Erdoğan (2005). It is comprised of three sections, eight dimensions and 53 items. Among the items, 17 of them were open-ended and 36 of them were closed ended with a Likert type scale. The sections and sub-dimensions of the questionnaire are presented in the Table 3.

Table 3. Sections and dimensions of the Needs Assessment Instrument

Section	Dimensions	Purpose	Question type	Number of items
1	*1.Background information*	Determining students' demographic information	Open-ended	4
2	*2.1.The Course (general)*	Determining students' general expectations on the course	Open-ended	6
	2.2.Instructor' & Students' roles	Determining expectations stated for the instructor of the course and students	Open-ended	2
	2.3.The Course (specific)	Determining students' views on the course (schedule, time, objectives, content)	Closed-ended (Likert type scale)	12
	2.4.Instructional methods and techniques	Determining students' expectations on the frequency of the use of such methods and techniques, and the degree of their importance	Closed-ended (Likert type scale)	9
	2.5.Instructional media (materials)	Determining students' expectations on the frequency of the use of such materials and the degree of their importance	Closed-ended (Likert type scale)	7
	2.6.Evaluation	Determining students' expectations on the frequency of the use of such evaluation and the degree of their importance	Closed-ended (Likert type scale)	8
3	*3.Attitudes*	Determining students' general attitudes toward the course	Open-ended	5

The items in 2.3. (see table 3) were on a five point Likert type (1-strongly disagree, 5-strongly agree). On the other hand, the items in 2.4., 2.5., and 2.6. were both five point (1- not important at all, 5-very important) and four point (1-never, 4-always) Likert type. In 2.4., instructional methods and techniques; in 2.5., instructional materials; and in 2.6., evaluation procedures, were asked the students to rate the degree of *importance* (1-not important at all, 5-very important) and the *frequency of the use of the issues* (1-never, 4-always) in class room.

Data Collection and Analyses

This study is the first part of a course evaluation project, realized for the course titled *"Education and Awareness for Sustainability". The project* comprised of three steps as NA, formative assessment and summative assessment. The basic steps followed in the course evaluation project have been presented in Figure.1.

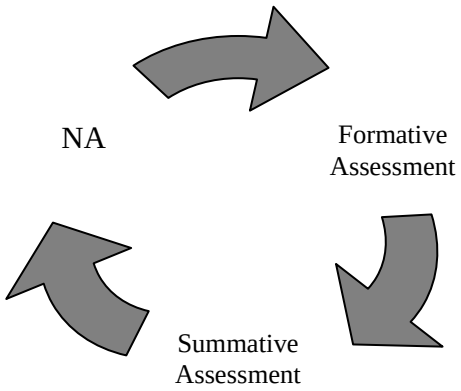

Figure 1. Basic Steps of the Course Evaluation Project

Four stage DIPO model (Erdogan, 2004) has been used in order to evaluate the course. The major considerations of the model are; determining students' needs (and/or expectations, priorities), adapting the program to the determined needs and detecting if these needs are matched with the program objectives. The stages of DIPO are parallel to those of the CIPP model (Stufflebeam, 2003) and are presented in Figure 2.

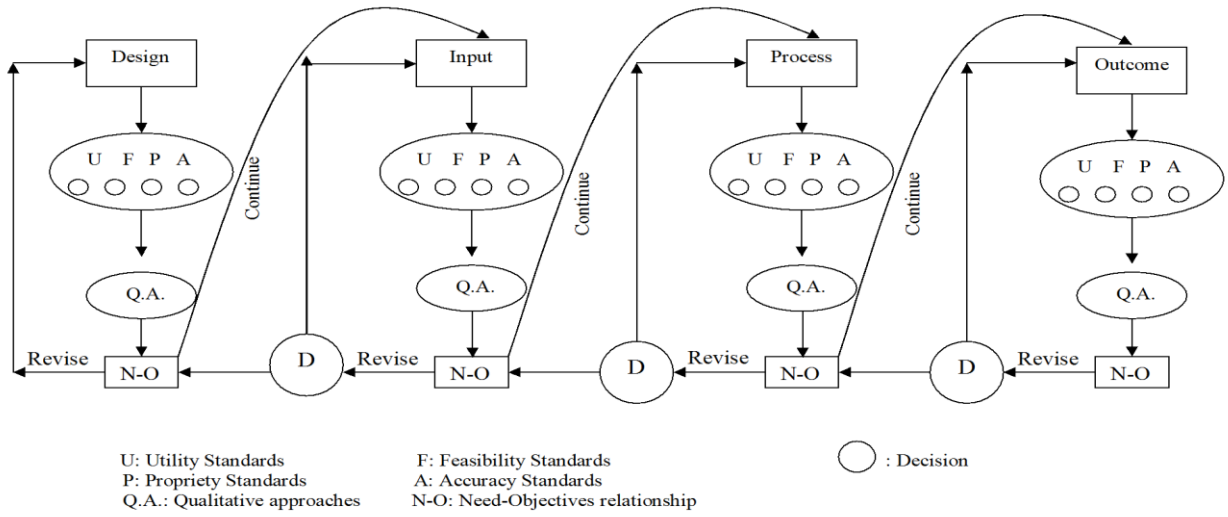

Figure 2. DIPO Model (Erdoğan, 2004) used for the course evaluation

The first step of DIPO evaluation model focuses on the needs-objectives relationship. The basic standards considered during the evaluation, on the other hand, are *utility, feasibility, propriety, and accuracy, as* suggested by Joint Committee on Standards for Educational Evaluation (1981). Thus, needs assessment (NA) is the first step of the model and is essential for conducting the rest of the evaluation. NA, on the other hand, was comprised of three sub-steps as; (1) preparation or planning, (2) instruments developing and operating - data collection and (3) analyzing and reporting the data.

a. Planning NA
Before conducting the NA, an informal interview was carried out with the instructor of the course and with one of the former students, a tentative instrument was prepared based on their opinions. The instrument was than, revised by an expert on curriculum evaluation and also controlled by the instructor. Some of items were changed and some have been added depending on their critics.

b. Operating NA
Once the instrument was developed, the application was performed in two days for two sections in class setting. NA was carried out at the beginning of the class (semester) in order to determine the needs and priorities of the students regarding instructional materials, teaching methods and evaluation procedures used in the course. A few students were absent during NA. Before conducting NA, the purpose and rationale of doing so was explained explicitly. The students were ensured about the confidentiality of the findings (propriety standards). They seemed to be voluntary for the application. Similarly, utility standards have been satisfied by the data that was obtained during the study.

c. Results of NAs
Since NA questionnaire included open-ended and closed-ended items together, both qualitative and quantitative methods had been used for the analysis. The emerging themes and codes resulted from content analysis of the open ended questions are discussed in the results part of this study. The quantitative data were analyzed statistically by the use of SPSS and consisted mainly of the descriptive statistics (mean, standard deviation and percentages).

FINDINGS
The results of the study are going to be presented by the sections and dimensions as given in the Table 2.

NA Questionnaire - Section 1
1.1. Demographic information

In addition to personal information, participants were required, in this section, to decide about the best item, among the choices given, describing their purpose to enroll the course. Students were given a chance to select more than one choice. Few students choose the choice related with enrolling the course to get credit (n=15). Some of them, on the other hand, stated that they choose because they think it may be easy to pass or because they think the subject is related to their future research in the university. The answers distributed as follows:

(1) *get knowledge for gaining environmental sensitivity (n=49),*
(2) know about the environmental problems faced (n=48),
(3) know ways of protecting environment (n=47),
(4) be aware of what has happened with regard to environment (n=47),
(5) inform the others about the sustainable development when they graduated (n=46),
(6) gain knowledge about the environment (n=42),
(7) observe the reflections of education on the subject of environment (n=39),
(8) learn about responsible citizenship (n=37)
(9) comprehend the education for sustainability (n=30)
(10) add the new experiences to previous ones about environment (n=15)

Section 2
2.1. The Course (General)
As indicated by Palmer (1997), the teachers should be aware of misconceptions and develop strategy to deal with them. Accordingly, in order to explore whether the students have misconceptions, whether they had pre-knowledge on the concepts of education, awareness and sustainability and whether they recognized the relationship among these concepts, the students were asked about the definitions of the three important terms, *education, awareness and sustainability*, that have been used frequently through the course. As understood from the students' responses, some students have misconceptions on these terms.

Many of the students defined the *education* as the intended process of changing behavior of the learner or individuals and changing behaviors from negative to positive. Some reported that education is permanent, deliberate, observable and process that provides viewpoints and thinking skills for individuals. According to the students, education is a life-long process; it is required for all because it prepares and shapes the individuals for the real life and it provides moral development for individuals and creates social interaction among them.

Most of the students defined sustainability as a means to ensure longer-breathed solutions for natural resource destruction. They generally reported that sustainability is related to the continuity of natural recourses for future generations. Most of the participants believed that it provides a balance among social, economic and ecologic life of a society and that the concept is a mean to develop and protect the existing values and beauty of the nature. Moreover, stabilization, balance, continuity, protection, recycling, reasonable use, minimum use, preserving, renewing, development and education are the key elements used by the participants in their responses.

Students' definitions about awareness included three major aspects as; *cognitive* (refers to intellectual skills), *affective* (refers to emotional skills) and *psychomotor* (refers to motor or physical skills). Students tried to make a connection between awareness and intellectual skills, emotional skills and physical skills at the same time. Actually, students' understandings on the concept, *awareness*, seemed to be confusing. They defined it as knowing and realizing what has happened in the environment by observing, learning, experiencing understanding, sharing with others and perceiving. According to the students, once perceiving and knowing about a problems in the environment, awareness results through consciousness and sensitiveness that arise as a result of the first two.

After gaining knowledge on the environmental problems and becoming consciousness, as claimed by students, there comes the time for action. Thus, students' responses can be summarized as that, when they become aware of the environmental problems they become knowledgeable about them and then they develop positive attitude towards the environment and as a result they act to overcome the environmental problems.

When the students were asked to identify the relationship among these three concepts, on the other hand, they reported that there was a strong relationship among these concepts and that they are complementary of one another: Education is the key or fundamental stage to constitute awareness and sustainability; understanding these three concepts helps to grasp values, consciousness, sensitivity, moral development and responsibility; these concepts are main elements of environmental education; the interaction among these concepts helps individuals preserve and protect the environment; living in healthy world is the main output of the interaction among these concepts.

Students were asked about their expectations from the course as a second part of the open ended questions. The question was "*what you expect to learn from this course?*" and "*what should the course objectives be?*". Their answers for the course objectives were as follows:

(1) *to instill environmental consciousness and sensitivity (reported by most of the students)*
(2) to share the information gained through the course with others (reported by most of the students)
(3) to be knowledgeable about environment, environmental problems and sustainable development, environmental organizations and their activities.
(4) to understand the influences of human being on environment and to minimize these effects.
(5) to be a part of the sustainable development movement.
(6) to learn about the ways of how to deal with environmental problems.
(7) to be aware of environmental issues in Turkey and in the World.
(8) to gain a wider perspective on the environmental issues
(9) to appreciate to the environment and beauty of nature
(10) to come up with alternative solutions for solving environmental problems
(11) to learn about the effective use of natural sources
(12) to disseminate the notion of environmental sustainability and consciousness
(13) to gain action skills to protect our environment
(14) to warn individuals or organizations about their negative influences.

It is interesting and encouraging to find out, as a result of the students' answers, that they feel as they are in a need to learn how to be a partner for realizing the sustainable development concept and they are aware of their responsibility for circulating the concept as future educators, engineers or decision makers. As indicated by many, they would like to learn how to be careful about the environment, how to deal with environmental problems, how to develop an active responsible behavior, how to teach the environmental issues to their students, how to inform the individuals about the environment. In addition to these common views, students' expectations from the course really differed since they were from different departments. Some were interested in learning balance among production, natural sources, consumption and environment, some (in) gaining environmental awareness, consciousness and sensitivity, some (in) getting their responsibility as a civic, and some (in) the importance of environment for individuals.

The course itself included only theoretical part. The students were asked their views about having practice session for the course. Nearly all of them indicated that a practical hour must be included. They claimed that learning by observing, doing, experiencing, living, touching, applying, feeling, seeing, exploring, exemplifying and matching with real life would be more permanent and meaningful for such a subject. During the practice hour, as they reported, field trips, factory trips, proficient organization trips and nature trips should be organized. One of the students responded the question as; "*observation of environmental problems will help us to feel it inside and intervene in them (student 13)*". The other asserted that *the environment course can best be learned in environment (student 72)*". Thus, students' opinion about adding a practice hour in to the course syllabus has been found reasonable by the instructor and she did so at the beginning of the term.

2.2. Instructor's & Students' Roles

The roles of teachers and students in classroom are one aspect of physical classroom environment. In this respect, the students were required to identify the roles of the instructor and the students in class. The students of the current study stated that the instructor should act as guide, democratic, motivator, informer, sometimes active, sometimes passive, presenter, model, intellectual, sensitive, relating real life, facilitator, encourager, interactive, not dominant, illuminating, charismatic, tailoring the class discussions and getting attention of students to the subject under investigation. In addition, they indicated that the instructor should be cheerful, knowledgeable about the environmental issues, environmentalist; (should) sometimes make a humor, (should) develop curiosity, (should) make the students think, and (should) create and encourage class discussion on environmental issues. However, a few students asserted that the instructor should act as lecturer and active, and have leading role in class.

In relation to their roles in classroom students stated that they should act as participator to class discussion, sensitive, interactive, concerned, sometimes passive, sometimes active, careful listener, problem solver, critical thinker, independent thinker, alternative thinker, protector, observer, pursuer, researcher, explorer and practitioner. They believed that the students should participate in class discussions voluntarily, produce solutions to problems, share his/her views with others, love environment, and be ready to act and learn.

2.3. The Course (specific)

According to the results of the statistical analyses, realized upon the answers of 75 participants, students think that outcomes and objectives of the course should be stated in a syllabus given ($\overline{X}$ = 4.32); the instructor should clearly define duties of the students ($\overline{X}$ = 3.88). They also indicated that objectives and outcomes ($\overline{X}$ = 3.87, 62 students), the content of the course ($\overline{X}$ = 3.68, 53 students), instructional methods and techniques ($\overline{X}$ = 3.98, 71 students), instructional materials ($\overline{X}$ = 4.03, 71 students) and the evaluation procedures ($\overline{X}$ = 3.92, 67 students) should be in line with students expectations and priorities. They also stated that they would like to be informed about the rules and procedures used in the class ($\overline{X}$ = 3.96, 69 students). Fifty eight students indicated that the office hour should be set by the instructor, so as to talk about their needs and problems ($\overline{X}$ = 3.67). Most of the students disagreed on the adequacy of the class size for conducting classroom activities ($\overline{X}$ = 2.43). As it was also understood from the students' responses, they are happy with the course content; they found it as interdisciplinary ($\overline{X}$ = 3.90).

2.4. Instructional methods and Techniques

The students reported that the use of methods of discussion ($\overline{X}$ = 4.30), brain storming ($\overline{X}$ = 3.86), individual project work ($\overline{X}$ =3.36), small group work ($\overline{X}$ = 3.36), in-class-group work ($\overline{X}$ = 3.31) and big group work ($\overline{X}$ = 3.27) were important for this course. Whereas lecturing ($\overline{X}$ =2.93), and tutorial ($\overline{X}$ = 2.89) were found as less important.

The students stated that the methods of discussion ($\overline{X}$ = 3.09) and brain storming ($\overline{X}$ = 2.98) should be used frequently during the lectures. The methods of lecturing ($\overline{X}$ = 2.47), small group work ($\overline{X}$ = 2.28), individual project work ($\overline{X}$ = 2.27), in-class-group work ($\overline{X}$ = 2.25), big group work ($\overline{X}$ = 2.20) and tutorial ($\overline{X}$ = 2.10), on the other hand, were the other methods mentioned for the students to be used during lectures.

2.5. Instructional media

Computer and projection machines ($\overline{X}$ = 4.5), visual materials ($\overline{X}$ = 4.25), video ($\overline{X}$ = 3.89), television ($\overline{X}$ = 3.62), research materials ($\overline{X}$ = 3.55), OHP ($\overline{X}$ = 3.53) and tape-recorder ($\overline{X}$ = 3.17) were stated by the students as the important instructional materials to be used during the instruction. Use of visual materials and statistical data were stated as the effective and special ways for the course.

As far as the frequencies for the use of instructional materials were considered, students pointed out computer - projection machines ($\overline{X}$ = 3.59), visual materials ($\overline{X}$ = 3.16), video ($\overline{X}$ = 2.84) and OHP ($\overline{X}$ = 2.79) to be used in class setting during the course. However, they preferred rare use of tape-recorder ($\overline{X}$ = 2.55), research article ($\overline{X}$ = 2.54) and television ($\overline{X}$ = 2.53).

2.6. Evaluation

Students reported that self evaluation ($\overline{X}$ = 3.95), teacher evaluation ($\overline{X}$ = 3.87), product-oriented evaluation ($\overline{X}$ = 3.59), project-based evaluation as a group ($\overline{X}$ = 3.58), project-based evaluation as an individual ($\overline{X}$ = 3.57) and process-oriented evaluation ($\overline{X}$ = 3.47) were respectively important as evaluation procedures to be used during the course. On the other hand, portfolio assessment ($\overline{X}$ = 2.98) and peer evaluation ($\overline{X}$ = 2.95) were less important. The students coming from department of engineering more emphasized the importance of project-based evaluation as a group and teacher evaluation rather than other types of evaluation.

Self-evaluation ($\overline{X}$ = 3.03), teacher evaluation ($\overline{X}$ = 2.78) and product-oriented evaluation ($\overline{X}$ = 2.76) were mostly rated evaluation procedures wanted to be used in the class. The students wanted peer evaluation, portfolio assessment, process-oriented evaluation, individual project-based evaluation and group project-based evaluation to be used rarely.

Section 3

3.1. Attitudes

At the end of the questionnaire, the students were asked about their attitudes toward and perceptions on the course overall. Students were firstly asked about what they feel about the course. Most of the students who enrolled the course in the last their semester believed that it is really important to take this course in the last semester. As claimed by one of the students,

"*I am thinking that it would be more effective to take this course when I am approaching to be a teacher (student 31)*". The other student supported this idea by stating that "*to me, offering this course in fourth class will be practical to apply our skills gained through the course to our teaching profession (student 35)"*. On the other hand, some students indicated that it would be more meaningful when the course is offered to each grade level because "*the tree has bended down when it is young (student 83)*. This idea was supported by the students coming from lower levels (2nd and 3rd level of students). Some students reported that the course should be offered as a must. The students believed that the course was really important to be aware of environmental issues. So, as indicated by one, environmental course should be offered in each semester.

Nearly all students thought that taking this course would contribute benefits to their own profession (teacher, engineer-mine,-food, -geology, -civil; and economist…etc). They tended to use and apply their theoretical knowledge and experiences regarding environment to their profession. It was possible for them to see the reflections of this course in professional life. For example, students indicated that they would model to other individuals in terms of positive attitude and responsible behavior. Students who will become teacher believed that they would instill environmental sensitivity, awareness and consciousness to the students, and (would) share their own knowledge about the environment with their students. They also planned that they would encourage their students to take action and to attend environmental projects. As it is clear from their responses, all the students would share their experiences related to environment with their employee, students, peers and colleagues when they start their profession. In this sense, one student from engineering department mentioned that "*as an engineer, I would give more importance to the treatment facilities of a factory and I would also help the workers become knowledgeable about the environment (student 15)*". As asserted by some, they would like to attend decision making process and make some changes in relation to protection of the environment. Some claimed that since the course was interdisciplinary in nature, the information discussed during the course might be adaptable to all professions. A student from department of business administration said in this regard that "*I am from administration department.* [This course will contribute me to] *use more effective the resources on my hand (student 54)*". The other student from department of mathematical education reported that "*I was thinking that mathematic is not related* [with environment]. *However, I am now thinking to mention something related to this subject* [environment] *to my students by considering not teaching but learning first (student 85)"*.

In addition to contributions to their own professional life, students also believed that there were some contributions and benefit of this course to their own daily life. They basically believed that this course really useful for them because it helps them develop new habits, environmental awareness, sensitivity and consciousness, respect to the environment, and also remind them of their responsibility, their influences on environment and the importance of sustainability. One student promised that "*I would be more careful in diminishing the foot print that I have left in the nature (student 4)*".

The course contributed the students for having environmental responsible and friendly behaviors, for being sensitive consumers, for eliminating the negative effects of themselves on the nature, for thinking about the environment and peoples' effects and for taking action to protect environment. As claimed by many, they used some sources (electricity, water…etc) more careful. Student 46 indicated that "[this course would contributed me] *thinking always*

about environment and natural sources, and remembering that this world is left me (us) to look after". They developed the notion of sustainable use of sources. As claimed by one, "*the basic example is that I have not left open the fountain any more when I am brushing my teeth (students 68)*". This course enabled them to control again their own consumption habits. Student 66 mentioned his new consumption habit and added that "*I am not drinking canned beverages any more. I am using less detergent, toothbrush and water. I am using unleaded oil"*. Actually, student 15's views summarizes in his friends' ideas "[this course contributes for] *being more sensitive individual to (environment and cases) and for looking the problems and issues from more broad frame"*.

As aforementioned, this course is open all the students in the university. From this perspective; since the course is interdisciplinary in scope and nature, and helps students rethink their habits, their behaviors, attitudes and understandings in relation to environment, it should be open to all students in university and be offered as must course. They added that this course is really important to raise awareness of students to their environments and to develop the understanding of sustainability. In addition, students indicated that the course was useful and provides practical information regarding real life. Content of the course was adequate, as claimed by the students. However, some students claimed that course capacity should be increased in number. As a whole, Student 52's view summarizes all the things in relation to the course. Student 52 said that *"because everyone is responsible for his/her environment where she/he lives, works, studies, so it would be better if it (the course) was offered for whole faculties as a must course"*.

CONCLUSIONS

NA procedure that was conducted with the students of a course on sustainable development indicated the students' expectations and needs in relation to course implementation. Their needs varied according to their subjects / departments. They mentioned their ideas on the basic concepts, interactions among these concepts, their expectations from the course, instructors' roles and their roles in class. In addition, desired instructional methods and techniques, materials and equipments and evaluation procedures were also indicated by the students. They indicated that they believe in that if the course is studied effectively and efficiently, it will help them to integrate the concept of sustainability both to their professional and social life. Having organized and then analyzed the data collected from the students through needs assessment questionnaire, the results were shared with the instructor of the course as a feedback. The instructor was said that if the expectations and needs of the students were integrated into the course from the area of objectives through the evaluation procedures, the course would offer more meaningful understanding to the students and it would reach its real aims/goals. Then, the formative evaluation procedure was started by considering the codes emerging from the Needs Assessment.

The results basically prove that the more the students' needs are integrated into the course implementation, the more the students feel attached to the course and the more they feel responsible for their learning process. Based upon the students' responses, it can be recognized that the best instructional methods to increase the awareness on sustainability were discussion and brainstorming; the best instructional materials were computer and projection machines, visual materials, video, television, research materials and OHP; and the best evaluation methods were self-evaluation, teacher-evaluation, product-oriented evaluation, project-based evaluation, and process-oriented evaluation methods. These results refer that the students would like to be used diversity of instructional methods and materials during the instruction, and to be evaluated by use of multiple evaluation methods.

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USING OUTDOOR THEATRE FOR ENVIRONMENTAL AWARENESS, EDUCATION AND LIFELONG LEARNING AT THE MOUNT CAMEROON ECO-REGION, CAMEROON

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Forest conversion to vast cash crops plantations on Mount Cameroon eco-region by Cameroon Development Cooperation since 1940s means limited land for subsistent agriculture for local people and biodiversity loss with the remainder shrinking to limited tracks of ecosystems.

Surprisingly these still have high endemism and biodiversity making the entire eco-region a biodiversity hotspot for conservation in the Congo basin. Unfortunately further environmental degradation particular from slash and burn shifting cultivation from subsistent farmers, expansion of human settlements and pollution are threatening further loss of biodiversity in this fragile eco-region. Conservation is imperative to preserve this high endemism and biodiversity for posterity.

Environmental awareness using workshops within this area where many people are still illiterates, witnessed poor attendance. From March 2002 to March 2005 we used outdoor theatre productions to achieve same objectives. In 20 outdoor performances in 20 villages, an overall attendance of 3447 persons was registered. This was about four times superior to the overall attendance of 862 persons registered for combined 20 workshops.

Impact monitoring indicated that 80% of 328 interviewees could repeat the key Environmental and biodiversity conservation messages engraved in the theatre productions compared to 48% for the workshop.

I. BACKGROUND OF THE STUDY

The Mount Cameroon eco-region since 1940 was converted from the rich forest to vast rubber, tea, banana and oil palm plantation by the Cameroon Development Cooperation (CDC) the second largest employer in Cameroon after the Cameroon government.
This meant limited land for subsistent agriculture for local people; natives and non-natives from other parts of Cameroon and neighbouring Countries like Nigeria, Congo, Gabon, Ghana, Equatorial Guinea, Central African Republic and Tchad.
Biodiversity loss was evident with the remainder shrinking to tracks of ecosystem, which range from Mangrove vegetation along the Atlantic coast through the high rainforest to montane grasslands from 3000m to 4070m.
Surprisingly, these still have high endemism and biodiversity with over 500 plant species and 300 animal species; hence making the entire region a biodiversity hotspot for conservation in the Congo basin.

A.1: Cross section view of some palms chocked with other plant species along the coastal zone of the Atlantic Ocean.

A.2: A panoramic view of the Mount Cameroon and its rich biodiversity.

As stated before, due to vast forest conversion to rubber, banana, tea and palm oil plantations by the Cameroon Development Cooperation, limited land is left for the local people who practice subsistent agriculture.

B.1: Local farmer

B.2: Vast Tea land at Tole.

Unfortunately, further environmental degradation particular from slash and burn shifting cultivation from subsistent farmers, expansion of human settlements and pollution are threatening further loss of biodiversity in this fragile eco-region.

C.1: Human Settlement at the flank of Mount Cameroon with plank houses built at a random (Congestion and pollution observed).

Conservation is imperative to preserve this high endemism and biodiversity for posterity and other benefits but a strong environmental and conservation education program is required to achieve these objectives.

II. METHODS AND MATERIALS (March 2002 to March 2005)

II.1

WORKSHOPS AND SERMINARS: Other Conservation Organizations like the defunct Mount Cameroon Project (MCP) and the Limbe Wildlife Center have organized workshops to educate and fight biodiversity loss in this area but the attendance have been very low. The Reformation Theatre Group of Limbe also organized twenty workshops in twenty different communities. The community Chiefs made an announcement inviting everyone to attend the workshops. The following attendance was recorded for men, women, youths and children:

	Men	Women	Youths	Children	Observation
Village 1	20	12	9	0	
Village 2	18	9	10	0	
Village 3	15	8	8	0	
Village 4	22	15	14	0	
Village 5	24	10	10	0	
Village 6	21	13	8	0	
Village 7	24	14	11	0	
Village 8	22	11	9	0	
Village 9	23	14	12	0	
Village 10	20	13	11	0	
Village 11	19	11	10	0	
Village 12	19	10	7	0	
Village 13	22	14	16	0	
Village 14	15	12	10	0	
Village 15	25	10	9	0	
Village 16	21	11	8	0	
Village 17	24	9	9	0	
Village 18	18	10	10	0	
Village 19	16	10	6	0	
Village 20	26	9	11	0	
TOTAL	**414**	**250**	**198**	**0**	Total Attendance = **862**
%	**48**	**29**	**23**	**0**	

Table 1.

NB: *Workshops were organized on non market and non popular village farm days*.

Picture of one of the Workshops.

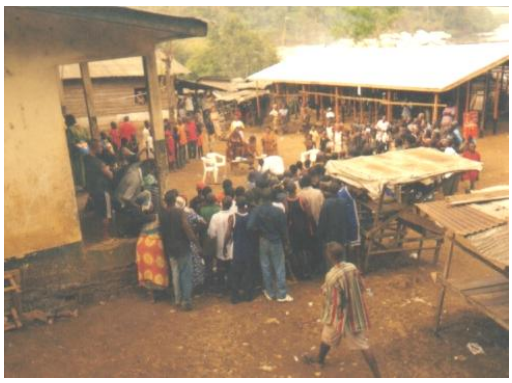
II.2

THEATRE OUTDOOR PERFORMANCES:

The Reformation Theatre Group then resorted to use theatre outdoor performances and music with same messages on conservation as were prepared for the workshops. The performances were scheduled on non market and non popular village farm days. The play entitled *Bitter Tears* written by the presenter (Edwin NJEBA NGANJI) was rehearsed and performed. Here is the attendance recorded after twenty performances:

	Men	Women	Youths	Children	Observation
Village 1	72	45	31	20	
Village 2	70	40	29	22	
Village 3	74	50	33	21	
Village 4	65	43	25	19	
Village 5	79	60	45	19	
Village 6	60	35	30	25	
Village 7	55	38	33	20	
Village 8	89	47	36	20	
Village 9	77	51	39	18	
Village 10	73	61	28	26	
Village 11	69	45	25	18	
Village 12	71	30	23	24	
Village 13	80	29	37	19	
Village 14	85	48	40	19	
Village 15	74	45	43	18	
Village 16	68	42	50	28	
Village 17	55	59	22	20	
Village 18	70	45	40	22	
Village 19	70	58	30	21	
Village 20	72	25	50	22	
TOTAL	**1448**	**896**	**689**	**414**	Total Attendance = **3447**
%	**42**	**26**	**20**	**12**	

Table 2.
Picture of one of the outdoor performances.



The chiefs equally sent their messengers to invite the public for the performances but the hitting of the drums, dancing; singing and acting brought curious onlookers together. An unusual gathering of men, women, youths and children excitedly laughing and clapping of hands between themselves regardless of sex and age was observed.

III. ANALYSING STATISTICS IN II.1 and II.2

The attendance at the theatre performances was about four times that of the workshop. Further analysis of the attendance showed that 68% (including 12% - all children) at theatre performances were illiterates compared to 12% at the workshops.

IV. MONITORING & EVALUATION

	Men	Women	Youths	Children	% (n = 328)
Workshop	61	45	51	0	48
Theatre Performances	81	73	87	21	80

Impact monitoring indicated that 80% of the interviewees (n = 328) could repeat the key Environmental and Biodiversity conservation messages engraved in the theatre performances compared to 48% for the workshops. Adults (Men and Women) were often opportunistically overhead at meetings and drinking places imitating some of the actors or narrating the dramas or singing some of the theatre songs. Children and youths were equally observed doing the same in addition to imitating the casts during children plays by day. Some even fought to own the names of some prominent casts they most admired.

V. CONCLUSION

The Rural people are still observed practicing slash and burn shifting cultivation and hunting indiscriminately to support their livelihoods; suggesting that some other factors such as alternative livelihood are required.

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A PROPOSAL MODEL FOR AN ENVIRONMENTAL EDUCATION AIMING AT SUSTAINABLE DEVELOPMENT

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In this study, from the educational perspective, we have attempted to provide an education model concerning formal and informal educational processes for the sustainable development which environmental education has had. This education model is based on a structure which has three components, to achieve the basic aims of the sustainable development. In the first one, the general content and approach which the educational processes are supposed to have, in the second one, the strategic point of view and attitude which are supposed to be adopted during the resource production and consumption and in the last one, the educational principles to be followed and the basic areas to be focused on are clarified.

Key Words: *Sustainable Development, Environmental Education, Environmental Education Model*

1. Introduction

The environmental education was placed on the agenda as a special educational area within the general educational system in the 1970s when the pursuit of a solution to the environmental problems was intensified. As the fact that the environmental destruction caused by humans' interaction with nature would be corrected by humans themselves became obvious, the environmental education appeared to be the main way to make cognitive, perceptive and behavioural change in humans for this purpose. In view of this fact, in the 1980s the environmental education was introduced in the formal educational programmes as a separate one.

However, it is evident that the processes of the formal and informal environmental education utilized for years have not created enough change of conscious and behaviour in the sustainability of life in the universe. Currently worsening unsustainability is the most evident sign of it.

Thus, in this study, we try to bring about a model of environmental education which will help to develop a culture of the sustainable life in the universe. The proposed model of environmental education is base on the basic dimensions of the sustainable life perspective and the strategies which are to be followed for this purpose.

2. The Scope

When the historical progress of the approaches of the environmental education is taken into consideration, three distinct approaches seem to have had significance [1]. "*Ecopedagogic* (*Ökopadagogik*)" approach, which appeared as a reaction to the instrumental character of the understanding of the general environmental education, simply recognized the experiential and participative educational environments as the "workshop" to overcome the environmental problems which immanently had social causes. "*Ecological Learning* (*Ökologishes Lernen*)" approach, which appeared through the environmental and peace currents in the 1970s, assumed the function of being the pioneer of the social transformation, developing an ecologically political view of environmental education in the individual. "*Experience of Nature*" approach, which placed the "romantic elements" against the "alienation from nature" as a reaction to these approaches, regarded the real priority of the environmental education as creating a perceptive awakening by providing rich educational experiences presenting nature for the individuals.

It is obvious that each of these three approaches was limited to certain priorities of the environmental education and thus could not develop an influential educational policy to overcome the unsustainability condition which the interaction between humanity and nature resulted in. Likewise, the point of departure of the approaches of the traditional environmental education is formed only by the three environmental problem areas – the environmental pollution, the extinction of biological beings and the increasing pressure of demand on natural resources. In this context, it is stated that the processes of the traditional environmental education are realized by basing them on a "scenario of disaster" as a reaction to the environmental problems threatening the future of humanity [2].

However, it is clear that the understanding of "the education for the sustainable development," which deals with the human-nature interaction and the environmental destruction in a more integrative way and which focuses on creating a view for the sustainability of life in the universe aiming at the future, brings about a new perspective of environmental education. The understanding of the education for the sustainable development differs from the traditional environmental education in three respects: (i) It brings the new life standard, the forms of production and consumption and the form of living together to the fore. (ii) It focuses on the network of the relations between the ecological, economic, social and cultural dimensions of the sustainability. (iii) It is based on the understanding of the constructive learning [1].

In this sense, unlike the traditional environmental education, the education for the sustainable development brings up a more comprehensive and divergent educational approach to construct a sustainable life reaching beyond reducing the effects of the environmental problems. Similarly, Morin [3] points out that the education of the future is to be based on "ecological consciousness," "consciousness of the world citizenship" and "dialogic consciousness" in the same way as the understanding of the education for the sustainable development.

In the light of all these, it is evident that unlike the approach of the traditional environmental education, which focuses on the environmental problems and the protection of nature with a narrow scope, the education for the sustainable development aims at producing a sphere of influence which is strong and large enough to enable us to create the conditions and tools of the sustainability of life on earth.

3. The Environmental Education Model for the Sustainable Development (Its Dimensions and Strategies)

It appears that parallel to the aforesaid change in the approach, the content of the environmental education has been enriched, comprising the ecological, economic and socio-cultural dimensions of the sustainable development [1,2].

The *ecology* dimension of the environmental education deals with the structure, operation and protection of the ecosphere, that is the comprehension and consciousness of the ecosystem. The *economy* dimension points to the stable economic development based on the sustainable use of the resources. In this framework, the economic dimension of the environmental education comprises the educational processes (of the approach of the national-resource-based development, which can sustain itself, instead of the understanding of the development at any price) aiming at developing the consumption habits caring about the real needs instead of the ostentatious consumption [4]. The *social* dimension suggests starting an awakening in the world regarding the fair distribution of the resources for living nationally, internationally and intergenerationally and forming the pressure groups for this purpose.

In view of this fact, the proposed educational model is based on three objectives towards the future: "*ecological supportability*," "*economic supportability*" and "*social justice*" [2, 5, 6].

This *first* educational aim of this model suggests that of the capacity to support the ecosystems should be protected from the outside pressures and influences, the *second* one suggests that the development activities should be limited according to the capacity to support and the sustainability of the ecosystem and the *third* one suggests that the *intragenerational* and *intergenerational* balance should be preserved in terms of the use of resource. The intragenerational dimension of the social justice suggests the administration of the justice in terms of the access to the basic resources both in the societies themselves, and internationally and interregionally. The intergenerational dimension suggests assuring not only the present generations but also the future generations of the possibilities of enough access to the world resources. From this point of view, the social justice, which creates the ethic basis of the education for the sustainable development, turns to the fair access to the basic world resources for all of the individuals and peoples at the present time and in the future.
In order to make the education model for the sustainable development function effectively with its aforementioned principle components and achieve the aims of the sustainable development, it must be based on an effective strategy which will supply a sustainable balance for the human-nature interaction. The educational processes based on this model depend on a three dimensional strategy, clarifying the attitude which should be adopted by individuals during the production and the consumption of natural resources, the educational principles which should be obeyed and the basic areas which should be focused on.

In this context, the basic components of the strategy to be pursued are as follows [1,6,7,8,9]

Efficiency: When the dimensions of the environmental destruction caused by producing, processing and using the resources unproductively depending on the inactive technologies are taken into consideration, it becomes clear that following a strategy which can achieve efficiency in the environmental education is very important. In this sense, increasing the efficiency in the production processes will help a lot to achieve the ecological and economic supportability and social justice. Thus a strategy which will provide us with the knowledge and experiences for the use of the world resources efficiently as much as possible should be followed during the environmental education. However it is stated that the measures to protect the environment based on the principle of efficiency will not be effective by themselves, so they must be supported by the other preventative strategies [2].

Sufficiency: Accordingly, a strategy which can make a change in the attitude and mentality to be content with the necessary type and amount of resource should be followed in the environmental education. In this way, it will be possible to prevent the waste of resource making it difficult to achieve the social justice objective and to reduce the pressure on nature by the excessive resource consumption.

Consistency with Nature: The third one of these educational strategies, which is necessary to direct the triple environmental education model, is called "*consistency with nature*." That the ecosystems are formed by the extremely sensitive processes of interaction which go on uninterruptedly in themselves requires the attitudes and behaviours towards the environment to have consistency and continuity with these natural processes as much as possible. In this framework, the environmental education strategy aims at providing the consciousness of taking care of the natural integrity in all the attitudes and behaviours towards the environment.

Recently it has appeared that the component of "solidaristic living together" has been added to the aforementioned educational strategies [2]. When the fast globalization of the environmental problems is taken into consideration, it can be asserted that in order to ensure the sustainability of life in the universe, the unique solidaristic consciousness must be given to all humanity.

The basic *principles* which are supposed to direct the education for the sustainable development are as follows:

Being Interdisciplinary (Interdisciplinary Information Acquisition for the Sustainable Life): Because the environmental problems are caused by the interrelated ecological and socio-economic factors, the environmental education should be carried out primarily in a way that creates the ability for "interdisciplinary" cognition, behaviour and awakening, embracing the related disciplines.

Integration: Because the ecosystems are complex systems based on the multilateral interactions between the organic and inorganic factors and because the environmental problems are complex situations caused by ecological and socio-economic factors, an integrative approach based on a systemic view should direct the environmental education processes. In this context, the environmental education should help to develop effective solution alternatives by way of integrating the consequences of the ecological, economic and social factors of the environmental problems. Thus the environmental education should integrate man's feelings, actions and objective perceptions of the world by creating a harmony between "head, heart and arm". Just by this method, the "network of relations" between the ecological processes and social processes, besides the one in themselves can be seen, the environment phenomenon can be comprehended as a dynamic system based on various factors and thus the environmental problems can be prevented and overcome to some extent.

Continuity: The environmental education should not be limited to an educational process which is realized for a short while during a period of a particular educational programme. On the contrary, it must be a basic part of the lifelong education and the general education. Therefore, it can be possible to instil the forms of attitudes and behaviours which have respect and sensitivity for the environment through the environmental education which will be provided in the general educational systems in the formal and informal educational environments starting from the preschool period.

Being Experiential: The environmental education should be an instructive experiential process (experimentation) which will help to learn how to comprehend and solve the problems with a high attendance on the spot. That the environmental problems can influence the everyday life directly and cooperation is needed to solve them necessitates the educational processes which help to develop practical solutions in cooperation by experimentation.

Questioning: The environmental education should not only be a process of comprehension, behaviour and awakening towards the environment, but it should also contribute to the formation of the social structure as to the creation of the conditions of the sustainable life. Therefore, the environmental education should be regarded as both an individual ethic approach and a complete social project [10].

Flexibility: Another principle of the environmental education is flexibility [11]. According to this principle, the frame of the environmental education programme is not to be drawn with definite lines, but rather it is to be designed to be flexible depending on the changing conditions. Moreover, the structure and the functioning of the school should be compatible with the phenomena and experiences in the environment outside the boundaries of the school and should be flexible enough to continually open up according to the changing conditions.

Extensiveness: Man affects the environment in which he/she exists in several ways and at the same time he/she is affected. The interactions between man and any natural and artificial environment are different. That is why the educational processes are to be extended to any kinds of environments with which man has an interaction in order to strengthen the effectiveness of the environmental education [12].

Globalization- Localism: That the environmental problems which appear in certain regions can affect other regions beyond the local boundaries necessitates the attention to the "local-global" interaction during the environmental education processes. In this context, the environmental education should follow an approach from the local to the general in terms of the principle of "thinking generally, acting locally." Thus in the light of the global cognition, it is possible to adopt a behaviour to solve the local environmental problems in a global cooperation.

Being Participative: As Geray stated [4], the fact that the environmental education has the characteristic of the education of democracy as to being able to use the "environmental rights," which is required by the "environmental citizenship" and realizing the "environmental responsibilities" clearly indicates the significance of the principle of participation. Moreover, the fact that in one of the important outputs of UN Rio Conference, "Local Agenda 21", the active participation of all social groups in the settlement units in the environmental protection has a priority increases the significance of participation in the environmental education. Realizing the sustainable development ideal is possible through the real participation of all related individuals and groups, not through the pressure from the top to the bottom [2]. This fact shows that the education which will function for this purpose is to be participative.

Constructive (Constitutive) Learning: The constructive learning is viewed as one of the most important principles of the effective environmental education. According to this principle, students should be able to construct and develop after processing new knowledge in conformity with their interests and needs on the basis of their past experiences (preliminary learning). Therefore, the environmental education, in accordance with its constructive learning understanding, should provide the processes which cause some changes in the understanding of the student's learning

Innovative Learning: The environmental education should comprise several forms of comprehension, behaviour and perception and innovative learning processes such as inventions and discoveries which will help students with construction. The following learning forms should just come after the realization of the learning processes through inventions [13]:
i) Participative Learning: This learning understanding, which can be described as learning through active participation in a group and experiences, comprises both the individual and social aspects of learning. In order to achieve the meaningful and permanent learning during the educational processes, an important part is to be given to the participative learning processes.
ii) Anticipative Learning: In short, this learning means developing an ability to predict the future using the present situation. In this context, this learning form functions as a complement to the participative learning. Especially in the development of the skills of prediction in individuals which is necessitated by the comprehension of the sustainable development, this learning form has a determinative role.

When we take into account the fact that the environmental education is an education of perception in addition to being the education of comprehension, the educational processes when realized are also expected to bring an aesthetic awakening which enriches an individual's emotions. Similarly, when we take into account an educational principle which can be described as "only the loved one is protected and the known is loved" [14], it is obvious that we are to follow a strategy which gives an important part to emotional education in the environmental education. The fact that in pursuit of increasing the effectiveness of the environmental education, the understandings and practices which can create an aesthetic awakening have gained significance recently indicates how important a role the education of perception has in the environmental education. According to the proposed model, the basic areas on which the environmental education processes should focus are as follows [14,15,16,17,18]:

School (Place) Centered: The effectiveness of the environmental education primarily depends on the educational environments which make the active participation, observation and experimentation possible. From this angle, schools and environments of lessons should be natural places which in a way support students' cognition and perception forms concerning nature. "Ecological school," models which have been placed on the agenda about the environmental education practices lately, embody this understanding. The environments of such schools enriched with living materials are turned into natural places where the ecological processes can be observed. Therefore, the educational environments become areas of life and experience where students can observe the ecological processes on the spot.

Problem-Centered: In order to comprehend the complex structure of the environmental problems and suggest effective solution alternatives, having students meet the ecological problems face to face is crucial. Just in this way, it is possible for students to understand the life-threatening aspect of the environmental problems while comprehending their complex structure, which has several factors and consequences and to find effective solution alternatives aiming at the future.

Practice-Centered (Experiential): Certainly, the learning form which is accepted as the most effective one in our age is going through the processes of cognition, behaviour and perception changes which are acquired from one's self experience. Thus through the experiential learning, learning takes on a more permanent and meaningful quality. In this context, in order to get the desired result from the environmental education, the educational processes should be enriched with the processes of the innovative practices.

Solidarity-Centered: Since the environmental problems transcend the borders, students have to acquire the forms of behaviour and perception concerning solidarity and cooperation going through the educational processes. Therefore, the special programmes, projects, activities, selective courses and open courses which will promote solidarity and cooperation, which are necessitated by interdisciplinary and integrative learning should be given an important role. The idea that all living things can exist in a shared "unique world" depending on each other can be instilled in this way.

Development, Value and Skill-Centered: If we take into account the fact that the environmental education is an education of behaviour and perception as well as being an education of cognition, the importance of instilling the system of values to protect the natural existence into students gets clear. In this context, the environmental education should be the education of "the environmental ethics," too. Therefore, the objective is to be instilling the environmental rights and responsibilities and to be developing an approach of ethics towards the respect for the continuity of the existence of the ecosystem and the universe.

Relativity and Uncertainty-Centered: Getting ready for the results of the increasingly complicated human-nature interaction and making predictions about the future can be possible if the environmental education approach based on relativity and uncertainty is carried out (2). In this context, it is necessary to comprehend the changeability of the general truths about the human-nature interaction and to follow the educational processes which will help to confront the uncertainty waiting for the future generations [3].

Conclusion and Recommadation

When we have a look at the period of about thirty years during which the environmental education has had a clear role in the general educational system, it is obvious that the environmental education has gradually become the most effective means of the environmental protection and the sustainable development. In view of the transformation of the environmental education approaches, the comprehension of the environmental education has extended out of the limits of the recognition of nature and the sense of protection to the creation of the human-factor which enables the sustainable development embracing all the aspects of the human-nature interaction.

From the educational point of view, the environmental education started being a common application embracing all the educational processes, rather than being an independent part of the general educational processes. Thus it can be stated that the environmental education aiming at the sustainable development has a potential to increase the chance of achieving the general educational aims.

According to the researches and experiences, the knowledge which is acquired through the environmental education is not always reflected in the spheres of behaviour and perception. Therefore, the proposal of the environmental education model sheds light on the general content and approach which the formal and informal educational processes are to have, the point of view and attitude which are to be adopted during the production and consumption of resources, the educational principles to be obeyed and the basic areas to be focused on.

The controversial aspects of the understanding of the sustainable development are excluded form the scope of this study and an integrative approach is adopted to enable the educational processes to provide the necessary comprehension, attitude and behaviour which will make life sustainable on earth. In this sense, the proposed environmental education model sheds light on the theoretical and practical pursuits of enabling sustainable life on earth.

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UNITED NATIONS DECADE OF EDUCATION FOR SUSTAINABLE DEVELOPMENT (2005-2014): THE INITIATIVES OVERSEEN BY THE ITALIAN NATIONAL COMMISSION

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In 2005 the United Nations announced the beginning of the Decade of Education for Sustainable Development, on which UNESCO (the U.N. agency responsible for education, science and culture) will be concentrating through the year 2014 – the UN Decade in Education for Sustainable Development was officially adopted by the UN General Assembly through resolution 57/254 in December 2002, (and called for in the Johannesburg Plan). The campaign is intended to teach people about the "culture of sustainability," understood as a long-lasting development approach that is in the best interests of all populations, and which builds progress through a correct relationship with the environment, continuing to battle poverty and illiteracy, protecting personal health, promoting peace and the spread of new sustainable lifestyles that have a positive influence on the environment and the world's population at large.

The Decade offers an opportunity for practitioners and education policy-makers who are often isolated from each other to join in partnerships and contribute to a collective and international imperative. The Decade provides an opportunity to concentrate attention on education and a platform to celebrate achievements. International agencies are documenting lessons learnt and seeking ways to support the social movement towards a better future.

The DESS National Committee

The *Comitato nazionale del Decennio dell'Educazione allo Sviluppo Sostenibile*, or DESS (National Decade Committee for Education About Sustainable Development) is responsible for discussing the initiatives to promote, verifying the activities underway and formulating proposals during annual meetings. In Italy, the *Commissione Nazionale Italiana* (CNI, or Italian National Commission) for UNESCO has been active since 2005, with the creation of a National Committee for the Decade that reunites the principle protagonists of the culture of sustainability in Italy, both institutional and non: Ministries, Regions, environmental agencies, associations, relative representatives, research agencies, educational networks in schools, NGOs, etc.

All the agencies that are a part of the Committee are officially part of the Italian campaign for the Decade, and have all underwritten its guiding document, the "Shared Commitment by People and Organizations for the Decade of Education on Sustainable Development,"[9] which was drawn up by the relevant scientific committee with contributions from interested parties. On December 19 2005 the program was presented to the public by the then-President of the Italian Republic, Carlo Azeglio Ciampi, who strongly encouraged its diffusion, especially among younger generations, during a special press conference.

[9] The text of the document "Impegno comune di persone e organizzazioni per il Decennio dell'educazione allo sviluppo sostenibile" is available at: http://www.unescodess.it/iniziative/materiali

The Shared Commitment indicates several priority actions around which to concentrate activities for the Decade that can be reinforced by support from everyone involved. These were provided through a participatory process, with the collaboration of all interested parties, who were then subsequently asked to join. The principle elements indicated in the DESS documents are the following:

- A meeting with politicians and the principle institutional members in order to present the Decade program and ask for its support;
- Encounters with social protagonists (businesses, unions, etc.), through the promotion of seminars, networks, meetings;
- An alliance with the world of culture, designed to promote sustainable models of consumption, utilizing the media and "spokespeople" from the artistic/entertainment culture;
- Initiatives aimed at primary educational institutions like schools and universities, as well as permanent education agencies, in order to distribute materials, experiences, promote meetings with outside subjects and train teachers;
- The definition of a program framework, with the decision to dedicate a specific demonstration (day/week) to Decade initiatives each year.
- The creation of reports on the experiences that prove the most efficient, to be distributed in all the appropriate areas, and to share with the international UNESCO headquarters.

Among DESS initiatives…
Imaging a "culture of sustainability" for future generations:
A booklet on sustainable development by the UNESCO Italian National Commission

The Italian Commission will produce a book I am currently developing together with Professor Aurelio Angelini (a member of the Commission) and my personal supervisor (morever, Professor Giovanni Puglisi, Rector of my university in Milan and President of UNESCO's Italian National Commission). The book is intended to be an instrument to develop environmental education, encouraging people to act, and helping them reflect on what sustainable development education means. For this reason, it will be distributed in many Italian High Schools.

The book will celebrate the efforts of people around Italy who are actively working in education to facilitate change towards sustainability. The passion, commitment, results and exchange of experiences in education for sustainability by practitioners and officials from across the world proved the movement's vitality, as well as the importance of investing in education for sustainability as an instrument to move towards sustainable development.

Our motivation for presenting this book is also to provide a stepping-stone leaders and educators can utilize to engage people in the 'United Nations Decade of Education for Sustainable Development 2005-2014', as well as to support the 'Johannesburg Implementation Plan' from the World Summit on Sustainable Development (WSSD). By the end of the Decade it will be important to assess how far we have come in creating a transformation in the way we run our organisations, do business and move our personal and collective lives towards sustainability. It is our hope that the framework presented here assists with this task.

National Education for Sustainable Energy Week

During the first meeting of DESS on May 24 2006, the National Committee supported the Italian UNESCO Commission's proposal to declare the National Education for Sustainable Energy Week, which was held from November 6th through the 12th , 2006 with events organized all over Italy aimed at educating both young people and adults about issues like saving energy, renewable resources and society's need to live in a more balanced and sustainable manner.

The initiative, promoted by the Italian National UNESCO Commission together with the President of the Italian Republic, included the participation of ministries, regions, schools, local agencies, associations, environmental agencies, research institutes and training agencies in diverse initiatives throughout Italy aimed at spreading the culture of sustainability, with particular emphasis placed on the theme of energy.

More than 250 educational initiatives were conducted throughout Italy during this busy week: information gazebos were open in public piazzas, visits organized to renewable energy plants, work conducted by schools was presented, interactive laboratories set up, plus games, exhibits, shows, conventions and much more. Many Italian schools participated in the initiative, organizing during that week presentations of work conducted, didactic laboratories, playful games and initiatives, seminars, information booths and educational exhibits. There were also countless shows, meetings, debates, guided tours of sustainable energy plants, film screenings and many other events organized, for a total of 200 initiatives throughout Italian national territory.

If we engage in change: Environmental education as education for change

The general aim of environmental education is change, and not the construction of a body of knowledge. In an initial phase, this aim was limited to a change in behavior – more respectful, less damaging, etc. – but this was rapidly transformed into a change in ways of thinking – even before acting – and methods for viewing the world.

The principle aim of the first international documentation and thought on environmental education was to conserve nature[10], but already at the Belgrade Seminar (1975) and, just a few years later, at the first International Conference on Environmental Education organized in Tbilisi (Georgia) in 1977 (during a period in which nations had begun to realize the damage that peacetime technologies, and not only those of war, were inflicting on an environment in which the oil crisis was highlighting all too well the limited nature of our natural resources) the international agencies proposed as an "environmental study" and action not only the natural environment, but also the cultural patrimony and constructed environment in general, beginning to place emphasis on the idea of both a social and economic development that helps protect the environment, in addition to improving the quality of life.

Thus educational objectives dealt with a new awareness (and not only the acquisition of knowledge) concerning the environment and its problems, the development of attitudes, values and behaviors, the ability to critically evaluate actions and situations, united with both individual and collective participation in the actions proposed.

[10] The PNUMA, Programa de Naciones Unidas para el Medio Ambiente, was established in Stockholm in 1973, and together with UNESCO it initiated the first International Program for Environmental Education in 1975.

The 1980s saw both a series of environmental catastrophes (we need only remember Chernobyl), and the expansion of market economies. However, these always came together with a chain of economic crises and indebtedness that was increasingly unsustainable for countries in the world's southern hemisphere. Nevertheless it was in Rio that the strategy for a sustainable development would be established through the proposal of Agenda 21, a document that starkly highlighted the divide between the path to change conducted by environmental education through reflection on its accumulated experiences, and the responsibilities that were formally acknowledged for it: while Chapter 36 of Agenda 21 assigns essentially quantitative tasks to environmental education (increasing the spread of information), rather than qualitative tasks and the objective of modifying values and ways of living, the Treatise on environmental education signed by the Non-Government Organizations who participated in the parallel meetings of the Global Forum put forth a wide, interdisciplinary vision of knowledge, recognizing environmental education as a factor for social transformation as well as a permanent process of learning based on respect for all forms of life (Global Forum, 1993).

The new marching orders – sustainable development – did not pass without criticism from those who for years had been laboring on theories and the practice of environmental education: the expression "sustainable development" is in fact a contradiction in terms that was utilized in part in order to legitimize established practices and shield them from criticism. Not by chance, right from its inception, the term has been accepted by most people in the environmental education community as an "umbrella" term that made it possible to enter certain programs and obtain certain financing, but which had to be justified, enriched and modified in order to obviate the ambiguity that continues to characterize it today.

Most notably the word *development* – which brings to mind an idea of quantitative, economic growth – has been modified over the years: people have preferred to speak of an "education for sustainability"[11], or a "sustainable future" (UNESCO program), or a "sustainable society"[12], in order to underline a distancing from a concept that is excessively connected with the economy.

Even the word *sustainable*, however, can and must be criticized, because it reflects a reductive image of the natural environment, considered a reservoir of resources that we must not exhaust if we want to maintain economic development indefinitely (Sauvé, 1999), and it refers to an idea of sustainability that, even though it calls into question the abuses of a market economy, does not offer any alternative. In fact, it seems mostly preoccupied with legitimizing the market economy because it is necessary: it is an attempt to impose the model of Western society, trying to render it more compatible with the limits of our planet.

[11] Cfr. Huckle, J., Sterling, S. (eds.), *Education for Sustainability*, London, Earthscan Publications Ltd, 1996.
[12] Cfr. Borgarello, G., "Sostenibilità e sviluppo locale", in AA.VV., *I volti della sostenibilità,* Torino, Università di Torino, 2002.

The confusion between education for sustainable development, education for sustainability and environmental education has remained a part of our current language (in Tessalonica in 1997, UNESCO used simply the term "education for sustainable development," while in Santiago di Compostela in 2000, UNESCO dusted off the term "environmental education" once again). The important thing, for people who work in this field and present its results, is not to forget the evolution of practices that has accompanied the terms being used, and to remain fully aware that "the concept of sustainability, a necessary reference point for environmental education over upcoming years, must undergo continuous critical revision with the double objective of avoiding its use as a means to hide approaches that have little to do with development, and to impede its indiscriminate application to any initiative that links environment and education" (UNESCO, Santiago di Compostela, 2000).

Environmental education must contribute to training the citizen of the future: that citizen who we cannot foresee, who we can only imagine and contribute to creating. The changes that environmental education proposes are first of all changes in the way we think – and see ourselves – in relationship to our world: we must develop inside schools the capabilities, knowledge and attitudes that make it possible to rethink our relationship with the world, directing it towards "living wisely with the earth"[13]. At the roots of the ecological crisis, there is in fact a loss of the meaning that mankind attributes to his relationships both with the natural world, and with the world of men.

For many years now we have known that "the idea that environmental problems can be definitively resolved simply by applying scientific and technological solutions is proving false" (UNESCO, Santiago, 2000), but it is only in recent years that we have begun questioning ourselves about even deeper conventions, about ideas of the world that we have never placed in discussion. Western culture is increasingly distanced from the natural world, largely based on the separation proposed by the philosopher Descartes between body and mind, between rationality and affectivity, between nature and culture. A vision of the world that devaluates concrete reality, supporting an attitude of detachment from it, creates as a consequence an indifference, a non-caring for things and for the environment.

In Western civilization *well-being* has now come to be almost exclusively understood as the availability of an abundance of things to be consumed and eliminated at a feverish rhythm in a society based on waste and irresponsibility. If the interpretation of happiness is "quantitative," based on owning the highest number of things, then needs become limitless, and a denial of limits becomes a refusal to place limits on our opportunities to be happy. On the other hand, mankind cannot renounce being a natural species just like any other, nor can it renounce its need to modify its environment in order to survive. It is not through unrealistic proposals of a "return to nature" and rejection of science or technology that we may build a new relationship with our planet. Today the mass media and schools continuously supply us with contradictory images of the world and nature: on the one hand they present scientific and technological

[13] Cfr. Mortari Luigina, *Abitare con saggezza la terra. Forme costitutive dell'educazione ecologica*, Franco Angeli, Milano, 1994.

progress as the ability to resolve any problem, on the other they decry both as being responsible for most of our environmental crises and catastrophes; by the same measure nature is presented as fragile and at risk, and at the same time we are invited to have faith in its self-organizational capacities and ability to heal itself.

In order to establish a new attitude, we need a new ethical disposition, an acceptance of the naturalness of human beings not as limit, but as possibility, as a necessary requirement for the expansion of our creativity. With respect to the tendency of refusing limits and exalting the idea of "going beyond the limits," the change lies in recognizing limits and constraints as sources of freedom and happiness. If we reflect on the messages that we are receiving from society and the mass media, we realize that books, average people, teachers and scientists all share a culture that Marcello Cini[14] referred to as "the culture of machine-ism." Without being aware of it, society and schools share a vision of the world that believes it is possible for man to dominate nature, and foresees the future effects of our actions as extending out on a planetary scale. This culture must be substituted with a culture of complexity in which the interrelation and contingency of all phenomena (and as a consequence, their intrinsic unpredictability) is recognized. Reducing the world to a machine, reducing the brain to a computer, a school to a program and a teacher's actions to a form of training means negating the fact that we are dealing with complex systems, with living, breathing individuals for whom each action is unique.

In an ecosystem, it is not possible to substitute a piece as one would a gear in an engine. Therefore, the ethic of being careful is not founded upon the defense of individual rights – those of human beings just as those of other living beings – but rather on the practice of taking care of the fabric of relationships that exist between the earth and the world at large which nurture our life itself. This does not mean doing away with laws, but rather giving these laws a heart. Care activities are characterized by keeping track not only of the context and subjects involved, but of how these subjects and their contexts interact with one another, in other words of a willingness to listen and learn new ways of doing things, in order to build a sense that gives meaning to even the simplest quotidian objects. The cure is not intended solely for practical activities, but for ways of thinking and imagining: the possibility of continuing to feel wonder, of re-creating reality, of empathy and sharing feelings, of thinking not in terms of separations, but of connections.

Actually, all our projects will be successful only if we are able to help people understand that environmental problems and sustainable development are not abstract issues, but are strongly connected to our life and happiness. In one of his recent papers, Scott Slovic mentions American writer Wendell Berry:

> One of the most eloquent American writers operating from a bioregionalist framework is Kentucky farmer, poet, novelist, and essayist Wendell Berry ... In his 1989 essay "Word and Flesh," Berry decries the tendency toward abstraction in contemporary environmental science and politics.[15]

[14] Cfr. Introduction: Cini, Marcello, *Un paradiso Perduto. Dall'Universo delle leggi naturali al mondo dei processi evolutivi*, Milano, Feltrinelli, 1994

[15] Slovic, S. "Love is Never Abstract: Bioregionalism, Narrative Discourse and the Value of Nature" *Watershed: Environment & Culture*, Brown University, Providence, Rhode Island, 2005, p. 18

Berry writes:

> The favorite adjective of [the environmental] movement now seems to be "planetary." …But the word "planetary" also refers to an abstract anxiety or an abstract passion that is desperate and useful exactly to the extent that it is abstract. How, after all, can anybody-any particular body-do anything to heal a planet? The suggestion that anybody could do so is preposterous. We must shrink our scope of concern and activity to the protection of the planet's "humble households and neighborhoods," acknowledging what Berry calls "the scale of our competence." And in order to accomplish this focus on the local, he urges readers to think about what they "love."[16]

I believe that a further quote from Berry is equally appropriate here:

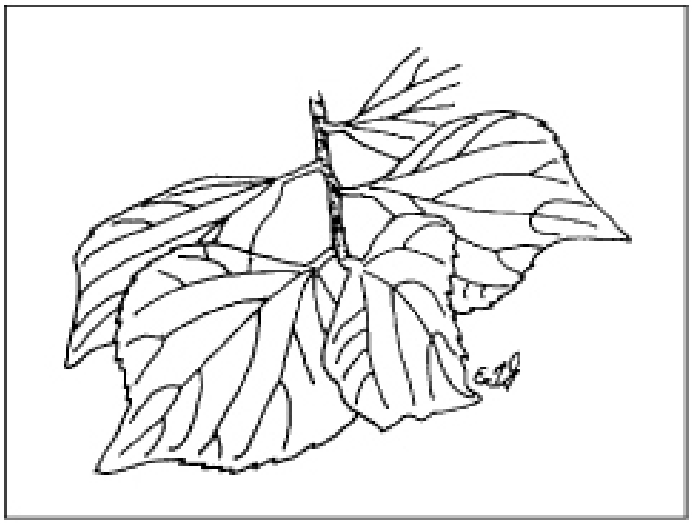
> Only love can bring intelligence out of the institutions and organizations, where it aggrandizes itself, into the presence of the work that must be done.
>
> Love is never abstract. It does not adhere to the universe or the planet or the nation or the institution or the profession, but to the singular sparrows of the street, the lilies of the field....[17]

I've thought about this, and my personal environmental education improved once I decided to look at the nature I could find nearby, for example the trees along my street. It was only when I concentrated on the local, the immediate, that I finally learned their names, their physical characteristics and their fascinating stories. Now I can say I've started to cultivate a sense of affiliation, of attachment, of love. Let me introduce to you my new friends and neighbours:

Scientific name: *Celtis australis*

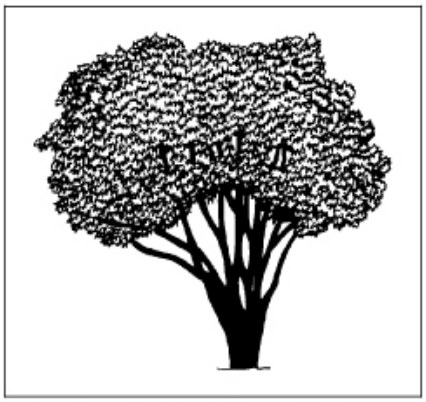
Pronunciation: SELL-tiss oss-TRAY-liss

Common names: European Hackberry, Nettle Tree, Spaccasassi



16 Berry, Wendell, "Word and Flesh," *What are People for?*, San Francisco, North Point, 1990, p. 197

[17] Berry, Wendell, "Word and Flesh," p. 200



Hackberry Celtis is a genus of about 60-70 species of deciduous trees widespread in warm temperate regions of the northern hemisphere, in southern Europe, southern and eastern Asia, southern and central North America, and south to central Africa. They are generally medium-sized trees, reaching 10-25 m tall, rarely up to 40 m tall. Several species are grown as ornamental trees, valued for their drought tolerance. They are good shade trees and can be very long-lived, perhaps to 1000 years[18]. Previously included either in the elm family Ulmaceae or their own family the Celtidaceae, genetic analysis by the Angiosperm Phylogeny Group has shown they are best placed in the hemp family Cannabaceae. In the European hackberry, the leaves are alternate, simple, 3-15 cm long, ovate-acuminate with a long pointed tip, and evenly serrated margins. The fruit is a small drupe 6-10 mm diameter, edible in many species, with a dryish but sweet, sugary consistency, reminiscent of a date. It is in flower in April, and the seeds ripen in October. The flowers are hermaphrodite (containing both male and female organs) and are pollinated by Bees. The plant prefers light (sandy) and medium (loamy) soils, requires well-drained soil and can grow in nutritionally poor soil, even in Milan. It prefers acid, neutral and basic (alkaline) soils. It cannot grow in the shade, requires dry or moist soil and can tolerate drought. The trees have deep spreading roots and are very drought resistant once established[19]. This species requires mild winters if it is to succeed[20]. Propagation is by seed, layering, and cuttings. The fruit and seed are sometimes sold in local markets in the Balkans[21]. This plant is said to be the lotus fruit of the ancients[22]. It is mentioned in the story of Odysseus returning from Troy, where it is said that if a person should eat the fruit she/he will never leave that area.

[18] Cfr. Huxley. Anthony, Julian, ed., *The New Royal Horticultural Society Dictionary of Gardening,* New York, Grove's Dictionaries Inc., 1999.
[19] Cfr. Huxley. Anthony, Julian, ed., *The New Royal Horticultural Society Dictionary of Gardening*.
[20] Cfr. Simmons. Alan. E. *Growing Unusual Fruit.* New York, Walker, 1972.
A very readable book with information on about 100 species that can be grown in Britain (some in greenhouses) and details on how to grow and use them.
[21] Cfr. Uphof, Johannes Cornelis Theodorus, *Dictionary of economic plants*, 2nd ed., rev. and enl. Lehre, J. Cramer; New York, Stechert-Hafner; Codicote, Herts., Wheldon & Wesley, 1968
An excellent and very comprehensive guide but it only gives very short descriptions of the uses without any details of how to utilize the plants.
Cfr. Facciola. Stephen, *Cornucopia - A Source Book of Edible Plants*, Vista, CA, Kampong Publications, 1990.
Contains a very wide range of conventional and unconventional food plants (including tropical) and where they can be obtained (mainly N. American nurseries but also research institutes and a lot of other nurseries from around the world.
[22] Cfr. Facciola. S. *Cornucopia - A Source Book of Edible Plants.*

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IMBIBING ENVIRONMENTAL AWARENESS IN SOCIETIES

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It takes a process for a fact to be adopted by the society, and education is the most important aspect of this process. Especially providing awareness for the environment individually in the society, takes a long time. An approach which is based on individualistic lifelong education, can be achieved by training conscious and sensitive generations for the environment in a cognitive and an affective manner. The target group for such education is children. The lead role for children's pre-school education goes to the parents. Therefore, core education must be initiated by educating the parents.

İmbibing the view of sensitivity on environment for adults is more difficult. However this can be achieved by perceiving the importance of environmental health in living territory. In developed countries you can clearly observe the individiual environmental awareness. When education system of these societies are taken into consideration, it is observed that they used the lifelong education as a tool to reach some targets and never made any restrictions about it because of education being their top priority. An accustomed behaviour of the people in developed countries is classifying the home wastes. This is a basic improve of the environmental awareness. Certainly this requires a long educational process. Also In this process, there must be the support of policy makers and administrators.

This study contains lifelong education for composing individually environmental awareness. The environmental education process in developed countries which includes the childhood, youth and adult periods are observed. As a result, the activities improving environmental awareness are put forward by scrutinizing the various educational methods.

1-INTRODUCTION

The goal of imbibing environmental awareness in societies is comprehending, preserving and caring the living and natural environment. The affection of nature could occur by identifying it. Environmental education (EE) is necessary to implement identifiying the nature. People can be made sensitive towards environment, can improve positive attitudes towards environment and take politicial decisions in favor of environment by EE. But achieving this requires much time like a lifelong education. Briefly EE must cover human life.

Inceptive EE for infants shows us reaching targets in EE is more successful with small childrens. And also this education colud be maintained in other life stages like school and business life. Otherwise catching a level in EE and achieving the targets will be difficult. The targets of the EE are development of attitudes, values, and behavioral skills in the area of environmental decision-making and problem-solving. So we could explicitly say that initiation of EE for pre-school ages turn into decision makers for adults. Therefore EE for adults is important. EE is a process involving generally three kinds of educational experiences;

1. Environmental discovery and inquiry
2. Environmental evaluation and problem identification
3. Environmental problem-solving [1].

After determining the goals of EE, There must be some principles about practices. These seven principles explained below can guide through the practices of EE.

1. Development of personal affinity with the earth through practical experiences out-of-doors and through the practice of an ethic of care
2. Grounding learning in sense of place through the study of knowledge possessed by local elders and the investigation of surrounding natural and human communities
3. Induction of students into an experience of community that counters the press toward individualism that is dominant in contemporary social and economic experiences
4. Acquisition of practical skills needed to regenerate human and natural environments
5. Introduction to occupational alternatives that contribute to the preservation of local cultures and the natural environment
6. Preparation for work as activists able to negotiate local regional and national governmental structures in an effort to adopt policies that support social justice and ecological sustainability
7. Critique of cultural assumptions open which modern industrial civilization has been built, exploring in particular how they have contributed to the exploitation of the natural world and human populations [2].

In U.S.A. where EE is seperated into branchs in a detailed study, and of authorities want to teach every person (containing all ages) to obtain and to understand the environment. So, with this approach, they believe they could prevent environmental problems.

Stapp and his friends have made the defininition of EE as such: “Environmental education is aimed at producing a citizenry that is knowledgeable concerning the total environment and its associated problems aware and skilled in how to become involved in helping solve these problems, and motivated to work their solution” [3].

EE is a comprehensive topic. Because of this, it requires eloboration. On the other hand sustainability of EE is important so that targets can be achieved in this study. We will consider EE in three major parts of human life. These are;

1. Pre-school Age EE
2. School Period EE (this contains Primary, Secondary and High School EE)
3. Proffesional ife EE (this group also contains the university students in order to get professional courses)

Although adult education is the most extended period, the lowest expectations are also in this part. This period is late for commencing EE and must be percieved as a continuation of previous periods. The knowledge obtained in previous educational periods is expanded in this period. To bring in some attitudes sensitive for the environment to the people in this period is difficult. The shortest period of the education is pre-school age period but it has the highest expectations. This is the core and the beginning ponit of the education. Core carries the raw material which a waits to be formed.

2- PRE-SCHOOL AGE EE

Pre-school age EE period, comprises of infant and toddlers and children till age 6. Infants and toddlers cover the ages of 6–36 months. World is new and wonderful for these children. Things in nature move on their own and change. Colors, texture and sounds are real. This is the best time to introduce natural environments to toddlers as they began to enjoy the freedom to move, experience the freshness of the outdoors and become comfortable in the natural environment. In this phase of learning, the most important thing is discovering and scrutinazing. In the activities of EE, children accompanied by an adult, are left in nature unobstructed in a controlled manner. Some considerations must be taken when teaching infant and toddlers like staying within a few yards of children at all time, encourage clothing that protects children from sun, cold, rough and sharp natural objects, keep hands and fingers out of holes, remove any thing you don't want toddlers to touch from their reach.

The second important thing that must be taken into consideration is teachers' behaviour in nature. Adults and teachers must show appreciation and respect for nature near them because in these ages children impersonate their parents or adults. For example they should touch turtles, cats, dogs or other animals gently and explore safe natural things with their senses [4].

At this period, many activities can be realized for EE. A terrarium or a formicarium can be composed with children. To make a terrarium children allowed to the nature to pick some branches, leaves, soil, sand, gravels, mosses, lichens and other natural pieces. After this, meterials are put in a glass or mica box. That is all for terrarium. To make a formicarium the same metarials are picked besides a group of ants. An observation of these formicarium and terrarrium could be expected from children. Also children can draw their observations. Student drawings of their observations and their verbal conclusions can help assessing their discovery [5]. In class, "matching colors in nature" activity can be suggested for children. In this activity children will match colored pieces of paper to the colors of natural items. They will explore same and different colored objects and shade of colors [6].

EE of pre-school age embrace the integrated education approach for perception of the world as a hole. İntegrated education has been planned in three phases:

1. Getting to know the world and ourselves
2. Skills and actions
3. Values and relationship to the world and ourselves. Activites in EE for pre-school ages can be realized by considering these phases.

In most European countries, pre-school care and education begins at the age of three. Pre-school and early schooling, demand particular care and attention. Childhood is a period of very intense development of all areas of the personality, in which about a half of a person's intellectual potential is developed. In the study of environmental knowledge assessment in Poland, with 320 children of 5 to 6 years of age. This quastionnaire study resulted in that, approximately % 60 high level of knowledge about nature determined in the group. Also they have the knowledge of basic rules for environmental protection; like to know the names and characteristics of plants and animals which are endangered, not to break branches, not to pick flowers in nature, to throw rubbishes in bin. The majority of children desire to live where there are attractive, healthy plants, animals, clean water, where the sun is shining and in a

law-abiding environment. Study indicates that children don't know much about animals, they think animals should always work for people also they dislike wolves, amphibians, reptiles, spiders. In the result of this study children's ability to notice the cause-effect relationship in the actions of humans towards nature was weak. This weakness had been seen related with the educational system and deficiencies of activities about EE. Children should be included in actions for the environment. Conclusion of this study is implementing the curriculum format for EE should be prepared by pre-school teachers, by coopareting with parents, local community and educational authorities. Although, in accordance with the rules of national strategy these points are suggested:

1. Widening and deepening the program of studies for pre-school teachers
2. Providing access to attractive teaching materials
3. Increasing the number of television and radio programmes presenting environmental content [7].

These suggested rules are general rules for achieving the targets of EE. So this shouldn't be thought only for Poland. The pre-school phase should be thought fundamental for EE and should support by various educational materials. This is the shortest period of EE but the qualitaty and quantity of stimulatives are important. There are many materials of EE for children which are attainable from internet like 3R's (Reusing, Reducins, Recycling) coloring books, narratives.

3- SCHOOL PERIOD EE (PRIMARY, SECONDARY AND HIGH SCHOOL EE)

This is the phase of reinforcement of the environmental knowledge given in the previous, pre-school EE phase, with lessons about environment. Paul Krapfel, The educator of Carter House Natural Science Museum in California, had taken the 4th and 8th class students into a camp for a week for ecological teachings. He asked students for an observation of any natural event during the camp. Another observation study had been implemented in the class. Every student had a flower which they were responsible to take care of. They had observed their flowers and noted the changes. This well received technique could have been applied to these slowly change flowers by marking. For example an ephemeral flower, petals exist only few hours, or there can be a very slowly flowering plant. They will investigate the natural process of the flowers. This will help them to percieve the nature life dynamizm. When students are aware of the ongoing changes happening to specific individuals, then they can begin measuring and graphing the changes. Awareness is limited to the obvious. By marking, they clearly can observe the changes in nature. These are examples of experimental studies of school period EE. Natural experiments can have various results. These variousnesses must be cearly explained to the children. Krappfel had found the solution of explaining the variablility by discussions in the class. He let the children to discuss their solutions then they apprehend the cause of variables. Even if the experimental subjects are same, results can be different. Class disscussions concerning all the variables, might be shaping the results and different possible interpretations could explain them. Krapfel thinks; as making the world more understandable for children by simplifying is a big mistake. He believes children's ability to grapple with the complex as long as they are given oportunities to talk about it and do follow-up investigations. He believes that complexity attracts and invigorates their minds [8].

To make the EE creative, some different spontaneous activities could be implemented. Educators must consider the following points;

1. Deeper participation
2. Awareness expanding beyond the obvious
3. Revelling in complexity
4. World as interconnected and dynamic
5. Fusion of intellect and emotion
6. Emergent diversity

What is aimed to be learned in EE? And why? This must be explained to the children. They should know the reason to believe what to do. Krapfel explained the reason like this: "If you don't learn how to read the world, then you will be dependent on others to tell you the stories, and you will leave your life according to their stories. But learning to read the stories for yourself will allow you to choose your own course." These reasons can be varified spontaneously.

Some of the schools have comprehensive EE program. One of these schools is established in 1995 in the Portland Public School Dsitrict, in Oregon as the consequence of a proposal that allowed a group of parents, students, teachers and other community members to start a new Environmental Middle School. This proposal approved by the Portland School Board. The school implemented the EE in the field. Environment would be at the core of the educational program and the program would ensure direct experiences with nature. In this school, aim to learn students totaliter approaches to the environmental problems and different overwies to be brought in. While achieving this, the importance of working in an interdisciplinary way is accented. This approach makes the overview real, analytic and wide [9]. For this phase of EE, evironmental knowledge lessons should be supported by environmental activities and experimental studies.

4- PROFESSIONAL LIFE EE (EE IN BUSINESS)

This is the phase of recalling the knowledge of EE of the previous phases. Also at this time, knowledge has brought into life by attitudes. People forget the knowlegdes they had got before due to economical concerns. Administral authorities should help implementation of EE in this period. These authorities could be non governmental organizations, local administrations or private companies. Private companies should give EE to their stuff whether they have environmental impacts in the extent of their business facilities or not. If they cause some environmental impacts with their facilities they should notify their employees about these effects. At this subject Canada could be pointed out as an examplary. A study implemented in two electricity companies in Canada for the environmental knowledge of employees and acquainted the environmental impact of the companies. Briefly it could be seen as an EE in private companies. It is implemented in three levels. First determined employees' whether or not they had a positive view of the EE program. The second level determined whether the participants had learned what they were expected to learn and whether the participant's impressions of the environment changed due to the program. The third and the last was the level of the knowledge acquired was assessed and compared to the environmental awareness goals derived from the literature. These included basic environmental knowledge such as the order of preference of the three "R"s of reducing,

recycling, and reusing, and aspects of the environmental implications of the company's specific field of work. The third level is the level of assessment of the employees' environmental knowledge to understand whether it is, close to achieving the targets or not. Assessment had been implemented by a questionnaire included 48 multiple – choice questions and six open – ended questions in three sections. These sections are 1- Environmental knowledge, 2- Environmental attitudes, 3- Environmental policy. Same questionnaire is applied in two different companies in the same sector. For the first section the results were nearly the same for two companies. But in the third section appreciable differences can be seen from the results. The first company had a good score in environmental policy section of the questionnaire. Also companies' employees are degreed for this assesment too. There were 5 degree of employees. These were in order of 1- Upper mangement, 2- First level mangement, 3- Customer service, 4- Internal maintenance and 5- External maintenance. Customer service stratum showed the lowest mean scores in the environmental knowledge section. Environmental awareness of company employees were different. Employees in lower position were less aware of environmental impacts of the company. These assesments should be taken into consideration when providing environmental awareness training. Companies and other organizations aiming for a more sustainable approach to their activities should increase the environmental awareness of their members [10].

Another study implemented in Ningbo which is a port city in Zehejiang Province located in the middle of China's coastline. Study based upon a survey on household electronic and electrical equipment. People living in Ningbo have comparetively higher income. Higher income stimulates consumption of different kinds of products so that the standart of living is improved quickly. The household electrical and electronic equipment (HEEE) is focused on household appliances including TV sets, airconditioners, refrigerators, computers and mobile phones. Chinese government is now facing the challenge of how to deal with household waste electrical and electronic equipment (WEEE). Establishment and implementation of WEEE reuse and recycle management systems depend on public awareness and involvement. This can be realized by EE for citizens. In the survey study color TV sets, refrigerators, air conditioners, personal computers and mobile phones were selected as representative items for WEEE. Study contains only a survey implementing by a questionnaire and provides information on the public's perception of the local environmental quality, environmental awareness and environmental performance, and of their willingness to pay for improving environmental quality and making green purchases. The results indicate that Ningbo residents are not satisfied with the local environmental quality, and they would like very much to share environmental responsibility. About % 64 of the respondents are aware of Chinese environmental labelling. Nearly % 70–80 of the respondents are willing to pay for environmental improvement and to purchase environmentally friendly products, respectively. According to the questionnaires, selling items to waste collection centers is the main method to dispose of wastes. The second method should be giving them to others or selling them in the second hand markets. Of all the respondents, % 61 choose to reuse and recycle waste electrical and electronic equipment. The succesful experiences in developed countries show that it is necessary to develop different recycling systems according to the different types of electrical and electronic equipment, since there are different kinds of electronic components. A governmental policy instrument, called the extended producer responsibility which has been implemented in some industrialized countries, has minimized solid waste effectively. The percentage of reused and recycled products has been enhanced enormously [11].

The other study implemented in 22 business school departments of universities and high schools of Finland. In business schools, students are seen as an administrative staff of future. So, they will be the authorities of the decision makers. Because of this reason, EE have been regarded more important and necessary for business schools. With this education, students can think of the sustainability of ecology as well as the sustainability of economy. Holistic education approach is adopted for EE in business schools. This means that in the learning process, knowledge, skills and attitudes should be combined in order for environmentaly friendly action to be achieved [12].

5- EE APPROACHES IN TURKEY

Unfortunately in Turkey EE is not detailed as in developed countries. In pre-schools, EE is restricted by environmental subjects of curriculum. Also for primary and secondary shools are the same. In professional life in Turkey, there are no obligatory rules for private companies about EE. In departments of universities that concern the environmental subjects, there are courses of detailed environmental knowledge. Furthermore for adult education there are variable facilities of environmental associations and organizations like Nature Association, Natural Life Preservation Association, Foundation of Tema, ÇEKÜL, Environmental Foundation of Turkey, Environmental Education Foundation of Turkey, Environmental Education Association… In this phase of EE in Turkey, universities' courses intended to EE are so detailed. To make students sensitive and conscious towards the environmental problems in universities; Ecology, Environmental Problems of Turkey, Environmental Law, Environmental Philosophy, Ecosystems, Man and Biosphere, Environmental Biology courses are given optionally. In directly relevant departments with environmental subjects, courses are indispensible.

However EE for pre-schools is not widespread in Turkey, there are courses about Environmental subjects. Some of these courses which taking place also in cirruculum for preschools are "Our House and Family", "Our Health", "Forests", "Summer Season" and "Plants and Animals". Some schools can have an outdoor activity program about EE also. But these activities are not imperative to implement. Activity programs are prapered by each school independently.

In primary and secondary schools; especially first three years of primary school "Life Knowledge" course contains the subjects of EE, and in 4th and 5th grades of the primary school "Science Knowledege" and "Social Knowledge" courses contains Environmental subjects. Especially the "Science Knowledge" course has a wide content for EE, containing subjects such as "World and Sky", "Earth Waters and Surrounding Air", "Matter and Energy", Biologic Earth Researches", "Our Anatomy" and "Healthy Life". In 6th grade nearly the same subjects are given by widely, different courses are "Diversity of Organisms", "Man and Biosphere",; in the 7th grade's different courses are "Solar System and Space" for last the 8th grade, the courses are "Matter Constitution", "Propagation of Orgasnisms and Heredity", "Man and Biosphere", "Surface and Subsurface Resources". Furthermore these courses, there are variable EE activities implemented like scout camps [13].

Table 5.1: Environmentally Subject Courses Given in School Period in Turkey

	Grades				
	1-3	4-5	6	7	8
Courses	Life Knowledge	Science Knowledege	Diversity of Organisms	Solar System and Space	Matter Constitution
		Social Knowledge	Man and Biosphere		Propagation of Orgasnisms and Heredity
		World and Sky			Man and Biosphere
		Earth Waters and Surrounding Air			Surface and Subsurface Resources
		Matter and Energy			
		Biologic Earth Researches			
		Our Anatomy			
		Healthy Life			

6- RECOMMENDATIONS

Compared to developed countries, in Turkey EE outdoor activities are weak. Briefly program contains theoretical courses but this is not sufficient. To make people sensitive and conscious towards environment in mind, requires assimilation. Assimilation can be implemented by facilities, activities in nature. Children must have the knowledge of the fact that they are a part of nature. They should make observations, experiences in natural environments. We should make them percieve the holistic world and natural systems. A study implemented by Tosunoğlu in 1988 as compared to 8th grade students for environmental knowledge in U.S.A and Turkey. Consequently, the level of environmental knowledge of students in Turkey was found deficient. The main reason for this result, can be percieved as the lack of the environmental activities. Children can't initiate the education. They are getting courses theoreticaly without any chance to compare or experiment the knowledge practicaly. Especially visuality is a main learning method for children. Pictures, photos, images are all reminding objects. These are effective teaching materials. Theoretical courses must be supported with activities and experiments, observations in nature. Briefly gripping methods can be used by teachers. Also drama is an effective learning method too. In developed countries, every province or every town has at least one botanical garden, arboretum, park or botanical park because the importance of visuality in learning process of EE.

Generally EE activities in Turkey don't contain business life. For adult or busines EE period we can only mention about courses in universities about environmental subjects and club facilities like trekking, camping and climbing. For private companies' EE, imperative directives about environmental issues should be thought. Especially, companies which impact the environment must be considered in this concept.

To make people sensitive and conscious towards the environment and imbibing environmental awareness in societies requires a long time and lifelong learning processes. These recommendations can be pointed out for effective EE:

- The significance of EE in Turkey should be increased.
- EE must be classified elaborately by considering people's interests especially for adult education.
- For pre-school and school period EE, visual education methods and spontaneous activities must be followed.
- Environmentally content media programs must be increased.
- Non-governmental and public organizations must be associated with people about environmental problems, and they must be effective on political decisions in favor of environment as the result of environmental awareness.
- There must be a compulsion of EE for private companies which have an environmental impact with their facilities to their staff.

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F. NIETZSCHE AND MARTIN HEIDEGGER: BUILDING UP AN ECO-PHILOSOPHICAL OUTLOOK

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"If you truly love nature
You will find beauty everywhere"
Vincent Van Gogh

In Van Gogh's short incantation, one can find a secret slogan about the proper perspective on nature. Only those who love nature can find beauty everywhere. As one important branch of deep ecology, eco-philosophy argues that the root of ecological crises lies in seeking environmental reforms through ideological and philosophical parameters in the world cultures. Eco-philosophy, as Naess states, aims at promoting deeper and more harmonious relationship among self, community and the natural world. The solutions of environmental crises can be found only by transforming one's fundamental world-view and practices by posing some metaphysical questions such as "what is human nature?", "What is the relation of humans to the rest of nature?" What is the nature of reality?" In this paper, I shall attempt to search for a ground for environmental ethics from the ecophilosophical standpoint by finding answers to the above in the writings of Freidrich Nietzsche and Martin Heidegger.

Nietzsche's Critique of the self, self-realization and view of nature in the Christian-platonic culture ;

To begin with, Friedrich Nietzsche is not an environmentalist. Neither did he explicitly say anything about the contemporary environmental issues such as forests, pollution, wildness or deep ecology or ecophilosophy etc. Writing in the 19th century, he already began to envisage the illusionary nature of the egoistic, anthropocentric selfhood with a specific world-view and nature at the threshold of the modern industrial, technological society,

Nietzsche's critique of the self and its relation to nature are closely related to the crises in the contemporary morality, which he also calls the Christian-Platonic morality. The search for absolute truths, as Nietzsche concedes, is the ideal of science and scientific practices. Today, the exploitation of nature, and the carelessness of the non-human is the expansion of the enlightenment project, i.e the reason's quest for not only the total control of nature, but of the sake of the welfare of humanity. For Nietzsche, such a scientific ideal is deeply embedded in the value system of the Christian ethics, disguising the will to power. With the advent of nihilism, he says, all values, including the ideals of science are shattered. Man is already at the stage of facing not only the nothingness his own existence, but also values that permeates all type of the practices of the rational man. Out of nothingness, arises a new man, furnishing with new set of values that are inherent in new forms of self, self-realization and nature.

Nietzsche discusses the modern man's alienation in the body-soul dualism and the latter's condemnation in the Christian ethics. In one of his later works, On the Genealogy of Morality, Nietzsche traces the problem in the ethics of the western culture to the process of socialization; the establishment of order, the shaping of the 'unrestraint', amoral people into 'fixed form'(62) which however, is achieved by a violent act that is called 'bad conscience'.

At this point I can no longer avoid giving a first preliminary expression to my own theory on the origin of 'bad conscience'. . . . I look on bad conscience as a serious illness to which man was forced to succumb by the pressure of the most fundamental of all changes which he experience,-- and that change whereby he finally found himself imprisoned within the confines of society and peace. It must have been no different for this semi-animal, happily adapted to the wilderness, war, the wandering life and adventure than it was for the sea animals when they were forced to either become land animals or perish—at one go, all instincts were devalued and 'suspended'. …the poor things were reduced to relying on thinking, inference, calculation, and connecting of cause and effect, that is to relying on their 'consciousness' that most impoverished and error-prone organ!. . . . and meanwhile, the old instincts had not suddenly ceased to make their demands! But it was difficult and seldom possible to give in to them; they mainly had to seek new and as it were underground gratifications. All instincts, which are not discharged outwardly *turn inwards*—this is what I call the *internalization* of man. (61)

In his account of socialization, Nietzsche foretells the psychological sickness which is an inevitable outcome of a physiological change that humanity undergoes; Nietzsche explains this human condition with reference to sea-animals. Just as sea-animals were forced to live on land, human beings are obliged to give up their animal past, the guidance of their instinctual drives as the price of becoming social beings. In instinctual drives, Nietzsche sees the sources of power and energy that enables human being to create and destroy. As the instinct can not be satisfied publicly, they are forced to turn inward. He calls this condition 'internalization' of man. Therefore, the self in the western tradition is embodied as psychologically sick and inwardly divided. In the practice of science as well in scientific optimism, Nietzsche envisions the same blocked instinct.

Our faith in science is still based on a metaphysical *faith*--- even we knowers of today, we godless anti-metaphysicians, still take our fire from the blaze set alight by a faith thousands of years old, that faith of the Christians, which was also Plato's faith, that God is truth, and truth is *divine.* (119)

Although science rejects religion and the belief in god as the only reality, Nietzsche claims that there is a close affinity between the moral values and the practice of science and philosophy. The emphasis is on the scientific activity. Just as religion measures god as the only reality, the practice of science and philosophy is mainly founded on the pursuit of truth. In the former, the truth of god is the only value, and in the latter, truth is divine; it is the highest and unquestionable value.

The idea of the blocked-instinct highlights the alienation of man from his own nature. Secondly, the image of man as a rational being is disguised by the interpretation of the self in the Christian platonic culture. The subjectivity of the Western man is another outcome of the violent act of the process of enculturation; he deceptively imagines himself as the subject ego. As Nietzsche puts it, (the subject) is something added and invented and projected behind what there is" (*Will to Power,* 481), " 'the subject': interpreted from within ourselves, so that the ego counts as a substance , as the cause of all deeds, as a doer. " (*Will to Power,* 488). The idea of the subjective ego is an invention. Its very inventory quality is due to the projection of a blocked instinct that the "I" interpret itself falsely. Nietzsche speaks of the modern man in the pursuit of nature as an illusionary ego that posits his/her illusionary image in accordance to its ideals. Regarding the ideal of knowledge and search for objective truth, Nietzsche says that they are nothing but a different shape that will to power (bodily, creative instincts) constructs itself; what lies at the bottom is the aesthetic sense of the beautiful both of which are the "means of the preservation of man, as *will to power*" whom the "I" derives joy in shaping and reshaping." (495)

The self-realization of man in science in the Christian platonic culture immediately reminds us of an anthropomorphic man with a particular attitude towards nature in which 'all motion, the 'appearances', 'laws' (are) only symptoms of a sick psychological event. This can also be traced in the dualistic world-view of the Christian morality, where man transcends his moral ideal not in the life they live in but in after death. The main problem in this world view and of particular nature is that it locates the man as the only end, out and above nature[23] with the emphasis on his genealogy. Such a concept of human nature and the separation of human beings from nature already prepares the ground of the selfish use of other-non-human beings in nature in addition to the natural resources

And thus, with the advent of nihilism, Nietzsche uncovers the illusionary nature of the rational man, aiming at helping man gain consciousness of his own situation and revalue their values. To some extend, Nietzsche's insights of the modern man's condition shows a close affinity with of the aim of ethics of the environment in several respects; the first is that it already changes the metaphysical stand of man, as the center of the world by reducing man as any of multiple species on earth; with this new awareness, man is no longer seen out and above nature and that his nature no longer justifies his constant exploitation of the other non-human and living species on earth by rendering them in the service of himself. Does this awareness, followed by Nietzsche's view of nature entail any ethical relationship with nature?

A closer look to Nietzsche's writing shows us that nature, however, is amoral, lacking any order, structure, and form. It does not possess any wisdom and it is beyond any human judgment of that sort. Neither does it have any instinct for self-preservation or any other instincts. All ongoing in nature is without divine purpose, and without any enduring substances. As Nietzsche puts it, "When will we complete our de-deification of Nature? When may we begin to '*naturalize'* humanity in terms of a pure, newly discovered nature ? (*Gay's Science,* 109) Nature, according to Nietzsche, is another instantiation of the will to power; it is a place which is made up of a multiplicity of forces that are in constant struggle to one another, and also connected by a common mode of nutrition, life and death(*Will to Power,*

[23] See also the discussion of man's relation to nature as the Western morality implies in"Nietzsche and the Debate on Wilderness Restoration" by Martin Drenthen, Environmental Values , 14, 2005. According to Drenthen, Nietzsche's writing, furthers the objective of deepening of our problematic relation with nature.

641). The best thing, in Nietzsche's term, is not to humanize the world, since, " to 'humanize' the world, i.e., to feel ourselves more and more masters in it." (*Will to Power*,614) The nature needs to be understood in its neutrality. In their attempt to humanize nature, the process of mastering has already been started. Nature is no longer a place to live in and that man still is in need of culture and urbanization to preserve his existence. Only through art, such a unity can be established.

One can conclude, then, that F.Nietzsche does not explicitly say anything that can be related to either deep ecology or ecophilosophy. However, that his view of nature and man in terms of will to power indicates no ethical approaches including, environmental ethics. Any attempt to develop any relation to nature in ethical sense immediately locates us to the illusion of the Western man. By emphasizing the contingent nature of everything, the preservation of the species and resources as well as the interpretation, he leaves the question open-ended.

Martin Heidegger's Critique of self, Self-realization of Da-sein in the Industrial-Technological Society

Martin Heidegger, on the other hand, is another thinker, which I believe to have influenced eco-philosophy with his criticism of his anthropocentric, subjective self in his substantive discussion of *da-sein*[24]. *Da-sein* is how each human being be, which he examines an ahistorical everyday experience; 'Availableness" or "Readiness-to-hand, or presence-at-hand and 'temporality' are *da-sein*'s existential structures that the self can be examined. *Within* these existential structures, all conditions and the possibilities of the self are revealed. In *Da-sein,* as Heidegger concedes, one can observe a lack of authenticity in the sense that none of the persons possess their own individuality Rather he derives its sources of being from the community; "the question of the 'who' is what maintains itself as something identical throughout changes in its Experiences and its way of behavior and which relates itself to this changing multiplicity."[25] Heidegger observes the groundlessness of *Da-sein (*self) in its average everydayness. The who of everyday da-sein is the 'they' which is characterized by groundlessness in the sense that it is average and leveled down in 'publicness'. The publicness, as Heidegger concedes, the total sum of all the ways human beings do. The 'they' is both everybody and nobody. It is a sort of flight to the average mentality without being conscious of the essence of what it means to do, to feel, to believe in certain things. The Da-sein as 'the-they' or as 'fallen' characterizes itself as follows;

[24] Heidegger makes use of the term to discuss the nature of being; it is not consciousness or rationality, but a different entity whose being consists in disclosing its entity within temporality.
[25] Being and Time, page, 150

In utilizing public means of transport, and in making use of information services such as the newspaper, every Other is like the next. This Being-with one-another dissolves one's own Da-sein completely into the kind of Being of 'the Others", as distinguishable and explicit, vanish more and more. In this conspicuousness, unascertainability, the real dictatorship of the 'they' is unfolded. We take pleasure and enjoy ourselves as *they* (man) take pleasure; we read, see and judge about literature and art as *they* see and judge; likewise we shrink back from the 'great mass' as *they* shrink back. We find 'shocking' what *they* find 'shocking'. The '*they'* which is nothing definite, and which all are, though not as the sum, prescribes the kind of Being of everydayness. (164)

The absorbing into the *they* is a kind of tranquility which is also characterized as a sort of irresponsibility which prevents *da-sein* from having to face its own potential for existence; likewise in conforming the public view on certain things, accepting already the forms of pleasure, joy, as well as moral and intellectual norms such as shocking and judging, *da-sein* reveals its own avarageness and leveling down. Heidegger, also speaks of the *da-sein's* fallenness, -the flight into the '*they'* in several cultural acts such as the 'idle-talk', 'curiosity', and 'ambiguity'; in 'idle-talk' Heidegger observes an average intelligibility, in which the 'they' closes of the hidden meaning and ground of what is talked about. In the idle talk, "what is said in-the-talk is understood; but what the talk is about is understood only approximately and superficially." (212) In 'curiosity', *da-sein* is constantly uprooting itself and concerned with the constant possibility of distraction. Curiosity is a kind of superficial knowing ; to know 'but just in order to have known', and 'without dwelling anywhere' and without thinking on it much(217). In 'ambiguity', what is meant is that the '*they'* behaves as though they are in command of every subject. At the bottom, however, this understanding is simply the behavioral codes in which nothing is genuinely understood. For Heidegger, the self in everyday activity is groundless, in the sense that lacks the genuine seriousness, commitment and responsibility in their existence. There is no goal in the cultural existence. Neither there is a direction for their development.[26]

It can be argued that Heidegger observes the same groundlessness of Da-sein in everyday life also in technology, and technological production, which also indirectly informs us the attitude towards nature. Like Nietzsche, Heidegger also discuss the condition of man within the advent of nihilism The groundlessness of the self in the technological era is discussed by examining the aim of technology and man's standpoint amid the technological process. As Heidegger puts it, "The revealing that rules in modern technology is a challenging (Herausfordern), which puts to nature the unreasonable demand that it supply energy which can be extracted and stored as such." (296). Here, Heiddeger's argument sounds rather ecological in the sense that it emphasizes the use of technology beyond any reasonable use. In the following parts of the essay, Heidegger contrasts the older and new forms of technology with reference to the use of mill. The energy supply from the will entirely comes from the wind without exploiting, extracting and storing anything. More examples are given about agriculture, which in the old times does not challenge nature. Agriculture of the contemporary time, to a large extent, challenges nature.

[26] Neitzsche, vol.1, Harper and Row, 1979. page 153.

Agriculture is now the mechanized food industry. Air is now set upon to yield nitrogen, the earth to yield ore, ore to yield uranium, for example: uranium is set upon to yield atomic energy, which can be released either for destruction or for peaceful use. (296)

Modern industry is an act of revealing, though this revealing is different from the older meaning of technology of the ancient times i.e the crafts and the expertise. To reinforce the difference, Heidgger makes use of a special term "standing-reserve" which is closely related to the idea of instrumentality which Heidegger mentions right at the beginning of his essay. Technology as instrumentality both in means and ends no longer exists but is changed into the mode of standing reserve. The term, standing reserve is merely used as a metaphor of the state of an object, which is being manufactured out of nature and stored further for use. It also emphasizes the aimless production. Heidegger means a blind recurrence of transformation in which man yields this chain of transformations through new interlocking paths beyond their control. He gives the use of River Rhine as a example for a chain of transformations in interlocking paths, claiming that the hydroelectric plant into the current of the Rhine turns the river into supply of hydraulic pressure, which in turn sets the turbines running. In the similar way, the same turning sets the machines in motion 'whose trusts sets going the electric current for which the long distance power station and its network of cables are set up to dispatched electricity." (297) The river, then, becomes something at human command, (standing reserve) where the unlocked energy in nature is transformed into new forms, stored up and distributed by new interlocking paths. In short, in the mode of revealing in technology regulating and securing becomes the chief characteristics.
With several examples, Heidegger discusses disintegration of the subject-object relationship which is present in the instrumentality of the traditional view of technology. He tells us that the traditional subject-object relationship, which is the essential characteristics in instrumentality, is reversed. Whatever stands by in the sense of standing reserve no longer stands over against us as object." the airliner is simply a standing reserve, which is ordered to ensure the possibility of transformation Man is also challenged in this chain of ordering, standing reserve.

If man is challenged, ordered, to do this, then, does not man himself belong even more originally than nature within the standing-reserve? The current talk about human resources, about the supply of patients for a clinic, gives evidence of this. The forester who measures the felled timber in the woods and who to all appearances walks to forest path in the same way his grandfather did is today ordered by the industry that produces commercial woods, whether he knows it or not. He is made subordinate to the orderability of cellulose which for its part is challenged forth by the need of paper, which is then, delivered to newspapers and illustrated magazines. The latter, in their turn, set public opinion to swallowing what is printed, so that a set of configuration of opinion becomes available on demand. Yet precisely, because man is challenged more originally than are the energies of nature, i.e, into the process of ordering, he is never transformed into mere standing-reserve. Since man drives technology forward, he takes part in ordering as a way of revealing. But the unconcealment itself, within which ordering unfolds, is never a human handiwork, any more than is the realm man traverses every time he, as a subject relates to an object. (300)

Despite the fact that man seems to be the only leading control, his condition is much worse than the objects themselves since he does so beyond their control. His taking part in the ordering further shows us that the machine technology becomes autonomous. The machines, or the products stand no longer to man in the object position, but the only subject which man becomes objectified. The demands on industry and the consumption already open new paths where man works through without predicting the following steps in the ordering. The idea of instrumentality in technology has been lost its nature and human beings are part of this the subject-object relationship in people's production and also consumption of the goods. As he puts it;

Thus, when man, investigating, observing, pursues nature as an area of his own conceiving, he has already been claimed by a way of revealing that challenges him to approach nature as an object of research., until even the object disappears into objectlessness of standing-reserve.(*QQT*,300)

Just like in everyday life, *Da-sein* in technological production and the consumption of goods reveals the same lack of depth, aim and seriousness which, as I have argued, causes the destruction of his subjectivity to a large extent. What makes man's scientific attitude towards nature problematic is not his subjectivity but rather the way man realizes his own research.\ and multiple ideals.

To sum up, one can argue that although both Friedrick Nietzsche and Martin Heidegger did not directly make any statement regarding the care of nature, in their criticism of the western self, their writings possess some influential eco-philosophical arguments with their criticism of western subjectivity. Friedrick Nietzsche highlights the ego-centric attitude by way of discussing human condition in terms of a cultural sickness, which also determines the attitudes human beings develop towards nature. The notion of self and the view of nature as the multiplicity of forces in strife as liberated from the scientific ideals of the Christain-Platonic culture enable us to establish a kind of interconnectedness between nature and human beings, which has formerly been lost due to a cultural sickness. Nietzsche's discussion of human nature in terms of will-to-power equates the former with any other species in terms of their aims and the nature of their living. Although it is not possible to restore man's previous state, and the view of nature, Nietzsche's writing can be judged as illuminating in the sense that he helps us check the values and the norms of self-realization that has brought humanity to the stage of destruction of nature as stated in Naess' environmental ethics. On the other hand, Heidegger's discussion of the human condition in the technological process and consumption sounds equally eco-philosophical for two respects; it builds up an awareness regarding the possible problems, caused by technology such as the ecological destruction, and consumerism. The understanding of the human condition would save us from the blind pushing with technology, or rebelling against it and a possibility of freedom from it. (Question Concerning Technology, 25-26) Therefore, one may be able to get technology under control, making it serve human beings' with rationally chosen ends. In Heidegger, the interconnectedness with nature could be possible only by way understanding human condition, the control mechanism in technology and everyday life, rather than being against technology itself.

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ECOLOGISTS TRAINING IN FUEL ENERGY AND CHEMISTRY TECHNOLOGY SPHERE IN AZERBAIJAN STATE OIL ACADEMY

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After rehabilitation of political and economical independence as a sovereign state our republic began to make the most efficient use of wealth historically created by people and presented to us by nature for gaining dynamic economical development. Carrying out of tasks serving for social-economical development of the country is closely connected as with economical so as with ecological factors. For strengthening economical potential of the country parallel solution of economical development and ecology protection problems have great importance. At the modern technico-technological stage of projects investigation progress designed for economical development joint solution of economical and ecological problems is an important requirement (demand) of the era.

Human is a part of nature. Protecting the nature he protects himself. Environment protection always depends on careful treatment of a human to the nature. Using the natural resources people gained great achievements. However a man giving very serious damage to self regulated mechanism of biosphere is at the stage of transferring to the weakest element of vital cycle in which he himself is involved there. That's why a man must be wise in regarding to nature and he must not spare investigation for the nature protection. People must always analyze scientific works for problems in this sphere for the sake of their lives.

Careful treatment to ecology is necessary for humanity more than to the scientific-technical revolution.

Azerbaijan Republic produces oil in the Caspian Sea from ancient times. Oil production in Azerbaijan by industrial method is carried out more than 140 years. But oil production from the sea shelves began since 1924 and even now its main oil fields are on the shelves. More than 170 structures have been discovered in the sea. Oil gas potential structures cover more than 70% of the republic territory. According to some calculations in the deepest layers of Azerbaijan ground there are possible great resources of hydrocarbons.

Using industrial method more than 1,4 milliard tons of oil have been produced in Azerbaijan. Realization of modern oil projects in Azerbaijan is connected with oil resources having been in the Caspian sector of Azerbaijan. Profitable geographical situation of Azerbaijan facilitates bearing out of produced hydrocarbon resources to the world market.

Simultaneously because of special technology and large investigation oil production requires a number of economical and political problems solution. At the present time our country individually deals with oil production problems.

Historically oil gas industry composed the base of Azerbaijan economy. Vigorous scientific – technical personnel potential, widely developed production infrastructure in this sphere have been created in our country. Azerbaijan presented production technology oil refinery to the world.

Namely this industrial sphere in the transitional period to the world market determined country economy development strategy. As a result for progress and economical independence support of our country such fateful idea as to create new oil strategy had been brought forward by common national leader G.Aliyev. Rich oil and gas fields development in accordance with our people's national interest at the expense of foreign investigation composes the main direction of successfully carried out oil strategy.

On September 20, 1994 by signing «Contract of the century» joint oil and gas field exploitation by many well-known companies has begun.

Export pipeline construction makes up one of the important integral part of the oil strategy. Construction of export pipeline Baku – Tbilisi - Djeyhan and gas pipeline Baku - Tbilisi - Arzrum can be examples of work carried out in this direction.

As during the process the use of oil gas resources, environment pollution is considered intolerable, that's why ecological requirements possess serious scene. That's why enterprises of oil companies together with many requirements they face with such requirements as to support the use of ecologically pure and non withdrawal technology. Simultaneously such tasks as to take necessary measures for ground recultivation and environment protection were put before us. Because of this in the areas covered the oil production, refinery and its transport great attention is paid to ecological safety. Namely this became the result of carrying out of additional measure on ecology safety in the investigation projects content. Now carrying out of investigation project in which arrangements on ecology protection is not taken into consideration is not allowed.

That's why nowadays investigation development of oil gas and oil chemistry industry requires highly qualified specialists' training on unique system frame including in itself elements of knowledge of ecology, culture, ethics and aesthetics.

Azerbaijan State Oil Academy (ASOA) is one of the first high institution in Azerbaijan Republic training highly qualified professionals in the sphere of environment protection.

Beginning from 1993 ASOA realizes training of bachelors and masterates on specialties: «Engineering of environment protection», «Safety and retreatment of natural resources», «Environment protection in the sphere of oil and chemistry», «Useful utilization of fuel gas and air space protection», «Environment protection and useful utilization of natural resources».

Beginning from 1999 in the frame of «TEMPUS» program ASOA realizes masterates training according to European compact agreement NO 20029-98 together with France university «Sophia-Antipolice» on specialties «Environment protection and Oil Industry».

Compact agreement partners:

- University «Sophia-Antipolice» in Nitsa (France)- coordinator;
- University Italy – Genoa;
- Institute «Oil and Engines France »;
- Azerbaijan state oil academy;
- Azerbaijan state oil company;

The main goal of compact agreement is training of highly qualified masterates on realization of environment protection connected (dealing) with oil and gas production and oil chemistry in the republic and particularly general area of «Environment and Oil Industry in the Caspian Sea region»

Graduating students got bachelor degree of high education on training directions in ASOA take part in the competition.

Admittance to masterate is realized by carrying out tests on informatics, ecology, economics, physics, English.

TEMPUS – masterate on speciality "environment and oil industry" differs by intersubject character and its main aim is considered – to train highly qualified personnel for oil industry on ecology speciality.

For obtaining this aim it was necessary to gain 6 below mentioned results:

- new academic plan preparation;
- lecturers training for urgent realization of academic plan;
- outlet of masterate on the international area.
- pedagogical facilities development
- results expansion;
- rational control and coordination;

During two years education graduating students of masterate "Environment and oil industry" studying subjects on full academic plan base take part in production practice, take exams and the study is completed by defense of masterates dissertations.

At the beginning of master courses functioning preparation and academic plan realization, new academic courses organization, owning of equipment and means (expenses) for modern education and gaining of last achievements in this sphere and seminars have been observed.

At the same time it must be mentioned that during this time business trips from the European countries to Azerbaijan and vice versa have been arranged.

According to the agreement signed in 1998 the program must be completed in March 2001. But the representatives of ASOA and European countries Union decided to prolong the duration of the program. General authority of TEMPUS program on education and commission of the European Culture allowed to prolong the duration of the program.

In the frame of coorporation with the representatives of Sophia - Antipolis and University Genoa, Institute of Oil and Engines, Paris and Azerbaijan state Oil Company for realizing compact agreement "Environment and oil industry" European commission 219 thousand euro was distinguished which considerably stimulated for grant owning and foundation of identical masterate at Oil Academy. The main goal of masterate foundation at ASOA is training of certificated specialists corresponding to European standards for solution environment problem from the point of view ecology in oil production and oil chemistry industry.

Subjects involved in this academic plan are grouped in the below mentioned directions:

1. General aspects of oil gas and oil chemistry industry;
2. Ecology and ecological problems prediction;
3. Environment protection;
4. Environment and Society;
5. Foreign languages:

As it has already been noted taking into consideration newly founded interfaculty masterates, for creation its activity and control of problems dealing with education led to foundation of Coordinated Board condition and working plan of which has been approved by editor of ASOA.

During two years in realization of contact agreement on the means of ASOA grant special office rooms equipped with computers, xeroks copy machines, TV sets, video tape recorder and other equipment and specialized library have been founded as well.

With the aim of experience exchange and studied subjects coordination in the frame of program carrying out 22 collaborators from ASOA have been sent on business trip to France and Italy. Ten of them have been sent on training to University Genoa and eight of them to Institute of Oil and Engines – Paris.

"Features of oil gas production industry and sources protecting environment"", "Features of oil refinery and oil chemistry industry and sources protecting environment", Environment monitoring"", "Oil gas treatment and oil chemistry industry safety in environment", "Scientific-technical progress and environment economy", "Economy analysis and oil production, oil gas treatment and oil chemistry industry control", " Legal ecology aspects in the oil and oil chemistry industry sphere" and as well as improvement of studied subjects qualification on the French and English languages linguistics was the main goal of the training .Together with the carrying out the compact agreement in ASOA seven collaborators have been sent from Nitsa, three collaborators from institute Oil and Engines-Paris and seven from university Genoa and they became their collaborators and according to masterate profile they had lectures for students – masterates and young lecturers. As an example to "Modern problems of environment" program coordinator we could show speeches of prof. Lui Cob from University Nitsa, program coordinator, "Economical evaluation of not restored resources","Investigation of oil and natural gas", "New research work on pollution in energy resources prof. Franko Prausello according to program of Nitza University Nikol Attiyan, Core Malenin " Environment economy", "Radioactivity and Human, docent Frederik Qittard of the same University "Test of oil production and oil refinery surfaces of active substances and others.

In masters training one of the nonconsiderable steps is connected the production practice. Accordingly for the education plan late of the second semester on the third week, late of the fourth semester on the twelfth week the first and second practice is undertaken. Generally the fourth semester of the academic year is undertaken only for production practice carrying out, master ate dissertations preparation and their defense. To carry out practice for masterates very good conditions in studying of ecological aspects in oil gas and oil chemistry complex sphere are considered. It will be very suitable to name some dissertation works. For example «Ecological aspects of owning Caspian Sea hydrocarbon resources », «Study of effect on washed fluids and on alive organisms living in the depths of the Caspian Sea», «Restoration of polluted by oil Absheron ground », «Utilization of dangerous in ecological aspect polichlorbenzol», «Mutually connected problems of ecology and economy», «Construction of underwater oil and gas pipelines and ecological problems of exploitation », «Utilization of acid withdrawals of oil refinery industry» and so on.

During 1999-2005 78 students graduated from the masterate.
Accordingly in the educational system in the Azerbaijan Republic beginning from 2006-2007 the above mentioned specialities on training of bachelor as «Engineering protection of environment», «Natural gas protection and secondary refinery», «Environment protection in the oil and chemistry sphere», «Useful utilization of fuel gas and air space protection », «Environment protection and useful utilization of natural resources », will be prepared on the base of new state educational standards being integrated by European educational standard.

The taught students on the mentioned specialities will have subjects as: «Basis of ecology», «Protection of atmosphere from industrial pollution», «Purification from industrial withdrawals», «Secondary energy resources and their usage», «Qualified analysis of environment monitoring», «Projecting basis and ecological expertise», «New ecological safety processes», ''Ecological situation in Azerbaijan and the ways of its recovering," "Organization basis of environment protection,» Theoretical basis of environment protection from withdrawals out of oil gas and oil chemistry enterprises," "Efficiency increase of gas burn (combustion) and environment protection», "Recuperation problems solution of polluted water and ground by oil products" and so on.

Total attestation step of bachelor is the defence of "Final works" and step of masterate - the defence of "Masteries dissertation". The defense of "Final works" is realized in State Attestate Commission but "Masterates dissertation" at specialized scientific boards. Course works, course projects and production practice carrying out is considered on bachelor stage and scientific- research, pedagogical practice, and summary at the masterate stage.

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PERCEPTION OF ECOLOGICAL RISKS AS AN ESSENTIAL ASPECT OF ECOLOGICAL CONSCIOUSNESS

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The subjective evaluation of risks should be considered as an essential aspect of ecological consciousness. However, it is clearly insufficient to take heed only of the *quantitative* material damages from the impact of unfavorable, or dangerous, factors of ecological or environmental change. It is also necessary to ensure a *qualitative* approach to the evaluation of the risks. This will involve the identification of people's priorities in their attitude to the totality of dangerous events or processes that are occurring, and which impact on the eco-system.

We evaluated how the qualitative perception of ecological risks effects ecological consciousness. In 2005 we conducted research into the perception of ecological risks in Saint-Petersburg and the Leningrad oblast. We investigated how significant were local, regional and global ecological risks to, them as a way to identify the relevant ecological problems in the everyday life of the residents of Saint-Petersburg and Leningrad region.

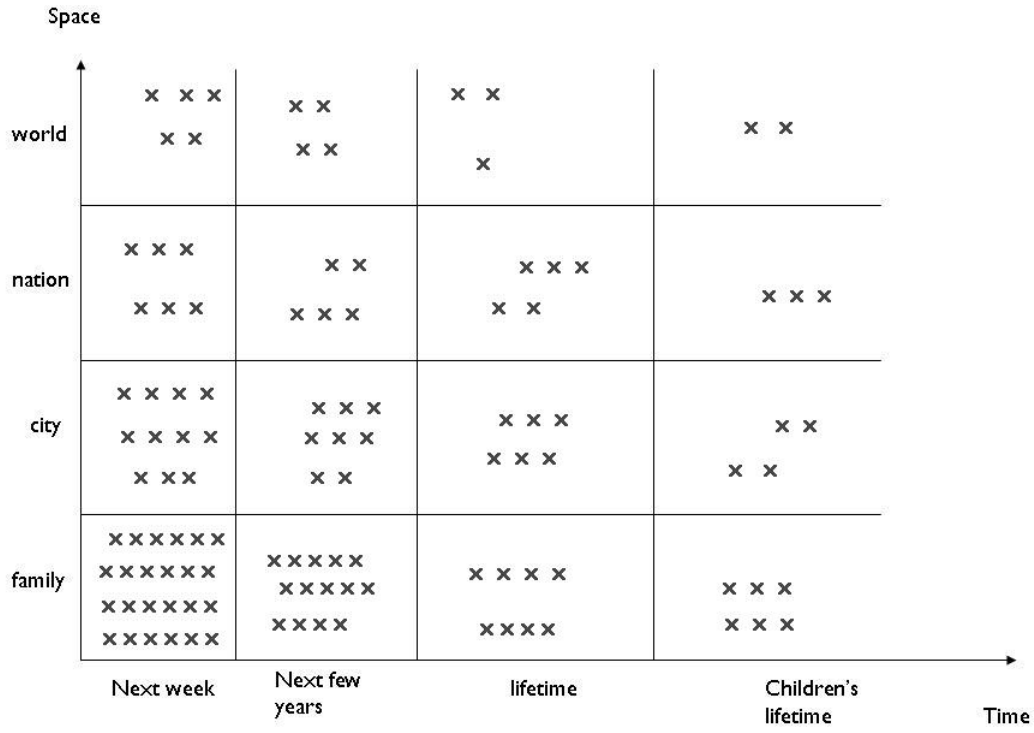
To solve this task we used the following methods: a social-psychological author's questionnaire; methods of diagnostics of subjective attitude to nature developed by A. F. Lazursky and S. L. Frank; Medows' test as modified by us; and the author's inquiry into "Ecological risks".

Ecological risks, as well as other ones, were perceived as a total threat, the facing of which people felt weak and helpless, and so did not want to think about them. Moreover, due to the seeming priority of social and economic problems, ecological risks are unfortunately not yet singled out into a separate category which is significant for people's own lives. Thus, the most topical issue, in our opinion, is the issue of identification of ecological risks as a separate category and the search for ways to make it personally significant. It is only through this approach that the existing ecological consciousness can be changed and turn human societies from its own immediate needs towards the needs of nature, replacing an anthropocentric position by an ecocentric one, and thereby improving the whole quality of life of both individuals and mankind in general.

1. Introduction

In their famous book 'The Limits to Growth', Meadows et al. (1974) set the problem, of exponential growth in the face of linear constraints, in the context of the spatial and temporal dimensions for the totality of problems that individuals face. They suggest that the concern of individuals is focussed on close people and close time, but that it is long term global problems that ultimately is the limiting factor for individuals' objectives. This bias towards immediate experience is very likely to lead to severe ecological and economic problems for the World as a whole. They illustrate their point by means of a diagram, a simple version of which we show below.

Fig.1 Human Perspectives after Meadows et al.



They also suggest that the range of an individual's perspectives depends on culture, their past experiences, and immediacy. Within the set of problems that could be thought to be ecological, we define this range of perspectives as being "ecological consciousness". An important element of past experience and immediacy will be that of ecological risk, and an individual's attitude to risk. This paper sets out to measure the extent to which ecological risk is an important component of ecological consciousness for contemporary Russian people, and the extent to which this differs between residents of a large city, St. Petersburg, and those living in small towns in the surrounding region of Leningrad Oblast.

Such differences can have significant impact for the conduct of environmental and ecological policy in countries where political parties receive the majority of their support either in urban or rural areas, such as Great Britain. There, which party forms the government depends on many factors, for example economic performance, and so the extent to which ecological issues are addressed will depend on the ecological consciousness of 'swing' voters and where they are located. Might such a situation exist in the future in Russia?

We first set out what it is that we mean by Ecological Consciousness and Ecological Risk. Next, we outline how we measured the Perception of Ecological Risk, and the results of this analysis. Then we investigate what are perceived as being significant ecological risks, and the importance attached the them as risks to individuals or risks to nature. Finally we present our conclusions.

2. Ecological Consciousness and Ecological Risk

Ecological consciousness comprises the totality of ecological ideas, of existing attitudes to nature and the respective strategies and technologies of interaction with nature. The primary reason why the emergence of this new direction in ecological psychology is important is that the solution of ecological problems of any scope requires a reconstruction of the currently dominant anthropocentric viewpoint, and its replacement by a new eco-centric one.

The current dominance of anthropocentrism in ecological consciousness is connected with the attention and focus that people give to local, and immediate problems and the consequent neglect of risks relating to the real ecological threat (Rydin et al. (Environmental Science, 2003); Abrahamsson and Ryden (1997)Foundations, 1997 and , etcect) This treats the global system as being separable between human society and the natural world. In contrast, the eco-centric position is based on an understanding of the unity of the "man – nature" system, a revaluation of the system of values, and a recognition of the responsibility for one's own actions, both on the local and global scale.

In the existing literature (Gifford (R., 2002); Bazerman et al. (The psychology…, 19971997);; Slovic P., (1987); Nickerson I.,(2003); Vaganov and Im (Ваганов П.А., Им М.С. , 1999), and etc. ect), sources interpret risk as being given by a probability of the event being evaluated, which is a process, or a phenomenon taking account of the factors of danger, that are threats to life, or to people's well-being derived from aspects of the Economy such as Capital or Institutions, or the Environment. Thus, we deal with a personally significant category, having an immediate impact upon human life and health, rather with an abstract category. However, this requires the availability of a certain probability, and for many environmental and ecological problems such a probability may not be known to individuals, or may itself be subject to considerable uncertainty. Such problems have been discussed within the Climate Change and other literature (see for example, see section and the papers cited in Ingham/Ulph social cost of carbon paper - Ingham A. and Ulph A., (2005)).

In connection with this, the subjective evaluation of risks should be considered as an essential aspect of ecological consciousness. However, it is clearly insufficient to take heed only of the *quantitative* material damages from the impact of unfavorable, or dangerous, factors of ecological or environmental change. It is also necessary to ensure a *qualitative* approach to the evaluation of the risks. This will involve the identification of people's priorities in their attitude to the totality of dangerous events or processes that are occurring, and which impact on the eco-system.

3. Modeling the Perceptions of Ecological Risk in Saint Petersburg

In order to evaluate how this qualitative perception of ecological risks effects ecological consciousness, in 2005 we conducted research into the perception of ecological risks in Saint-Petersburg and the Leningrad Oblast. Our sample consist of groups of 5th year students-psychologists (30 people), physicians (28 people), psychiatrists (30 people) and nurses (12 people) aged between 19 and 64 years, the average age being 29.8 years. A total of 100 people – 33 males and 67 females – took part in this study. We investigated how significant were local, regional and global ecological risks to them as a way to identify the relevant ecological problems in the everyday life of the residents of Saint-Petersburg and Leningrad region.

All the respondents study or work in St. Petersburg, but 64% live in St. Petersburg, and 36% are residents of small towns near it – such as Gatchina, Pushkin and Vsevolozhsk.

To solve this task we used the following methods:

1. A social-psychological questionnaire that we have previously undertaken (Smolova (C2005)). This questionnaire included questions on the sex, age, education, family status of the respondent, and questions intended to reveal the opinion of the interviewed on issues connected with their mode of life and environment.

2. Methods of diagnostics of subjective attitude to nature developed by A. F. Lazursky and S. L. Frank (see Yasvin (2000)). The place given to nature by the interviewed, in their system of values, was determined by the expressly diagnostic methods for the dominance of the subjective attitude to nature . The ranking of 9 categories (money; nature and animals; people; sex; power; labour (study); morality; art and science; person himself) was used to calculate the average point and the first 3 positions are considered to be highly dominant categories, the 4th to 6th positions – medium-dominant and 7th to 9th positions – low-dominant categories.

3. Our own version of the analysis of perception as presented in chapter 1 of Meadows et al. (1974). This consists of 2 dimensions – time and space, and examined priority for interest in events relating to different degrees of spatial-social remoteness, or distance (see Table 1).

4. A previous inquiry that we undertook into "Ecological risks". (Smolova (2005To create the "Ecological risks" questionnaire we used sources in the literature (Schmidt and Gifford (989); Bazerman et al. (1997), Evans and Stecker (2004) etc.) to identify the 37 most often mentioned ecological risks. These were divided into 3 groups: being either locally significant risks, regionally significant risks, or, globally significant risks. The participants in the survey were asked to evaluate each risk by a ten-point scale for 2 categories: risks to oneself (where 1 – poses no threat to my life, 10 – I can die from it), risks to nature (where 1 – it poses no threat to nature, 10 – nature can perish).

4. Results of the Analysis

In our opinion, the most interesting result obtained from the analysis of the social-psychological questionnaire was the fact that being satisfied with the ecological state of the place of residence was reported by 46.48%, whilst 53.52% of the respondents appeared to be dissatisfied. Thus, this data shows relative satisfaction, compared to what might be generally expected, with the ecological state of their place of residence. Studying social activity, we asked a question about participation in 'subbotniks or субботники' (voluntary environmental weekend work) and other activities intended to improve public zones. 64 % of the respondents answered the question negatively, citing to their lack of information about them or just lack of desire to spend their time on it. The remaining 36 % of the interviewed answered positively; however, all of them were residents of small towns near St. Petersburg, such as Gatchina, Pushkin or Vsevolozhsk.

In Saint-Petersburg, a very large city, not a single participant surveyed undertook voluntary environmental work as 'subbotniks'. Such indifference can be accounted for by the specific features of the territorial behavior of residents of a large city, people's personal motives, social, economic and cultural-historic prerequisites. In a large city, open space appears to be perceived as "No Man's Land" and, therefore, people have no motivation to modernize or improve it. It is also possible that previous experiences of participating in such events did not

provide any personal satisfaction and visible results. It may also be connected with Russian history from the time when such events had an element of enforcement, and there was a desire by society to solve the problems of housing services, without financial resources. Labor and social activity by the population in general, which were then proclaimed as values, are nowadays depreciated and nullified.

However, residents in small towns try to ensure control over their own territory and have greater belief in the significance of their own contribution to the improvement of their territory. Thus, whilst there are the same cultural-historical and social-economic conditions, the difference in the nature of territories reveals quite different spatial behavior towards local ecology and the environment. This reflects the extent to which individuals feel ownership of their public and open spaces.

Survey participants also referred to there being insufficient information about the ecological state. At the district level this was for 29.5% of respondents, at the wider city level 36.6%, for the whole of Russia 18.3%, and for the world as a whole 28.1%. There was substantial desire to get more information, and the proportions wanting more information at the various spatial levels increased to 65%, 63%, 46% and 45%, respectively. This lack of individual activity regarding improvement of the environment with the simultaneous desire of individuals to get more information about the ecological state of the area can be interpreted ambiguously and requires further analysis and research.

The diagnostic methods of the subjective attitude to nature study showed that the category of "nature" does not have any high significance for any of the respondents from either the emotional (5.1 points), rational (6.0 points) or practical point of view (6.1 points). More precisely, it is not the leading one in the system of values. This can be accounted for by the fact that the research was conducted in an urban environment and in everyday life the poll participants, being city residents, mostly interact with information, social and artificial environments. Experiences of natural or modified environments are less able to inform city residents in any way about ecological issues compared to faster and more habitual methods of learning about these issues that they experience". The higher degree of significance of the "nature" value at the emotional level is especially noteworthy. The following example will be quite appropriate here. According to the data that resulted from the social-psychological questionnaire), 52.2% "go to the country to have a rest" every two months and less, 15.4% go once a month, 9.8% go twice a month, and 22.5% go more than twice a month.

However, this does not mean that the category of "nature" is a clearly denied value. Citizens can compensate in their own flats for the impossibility of frequently "going to the country" in the form of houseplants (available for 92.9%) and pets (63.3%) as well as by visiting city parks in their free time.

On the basis of the data of the Meadows' analysis test, that we used (Table 1,) we can conclude that the top priority for interest in events relating to differing degrees of spatial-social remoteness, or distance, is taken by the category of "My family and myself" followed by the nearest social surroundings – "friends, acquaintances and neighbors" and then "Russia". The fourth place is taken by "World" and the fifth – by "Saint-Petersburg". Priority generally declines the more remote is the social relation, and the further away in time is the event. So that the highest priority is given to 'My family and myself' now whereas the lowest

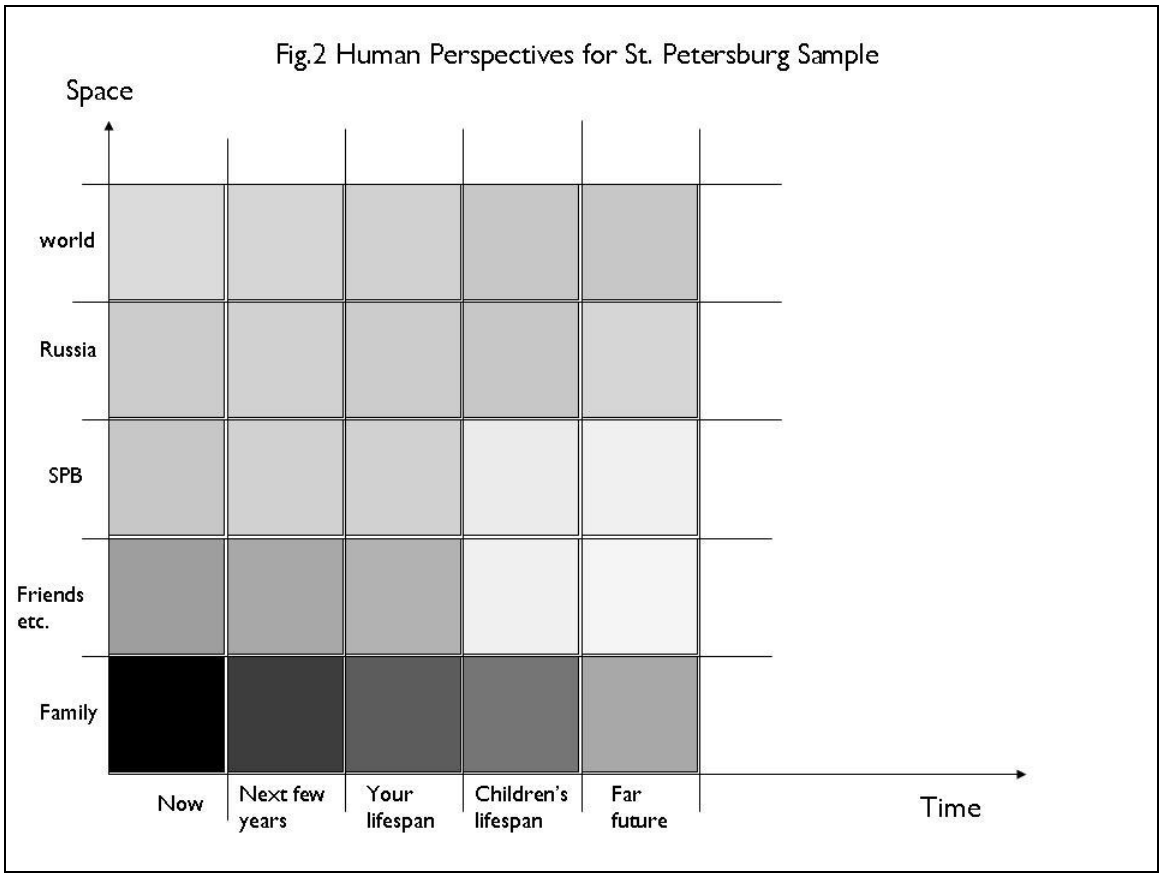
priority is given to 'friends, acquaintances and neighbors' in the lifetime of grandchildren and great-grandchildren. For the present time, priority uniformly declines as the area becomes more general or remote, and as time becomes more distant. This is certain to be connected with the basic needs, their satisfaction being determined by the closest surroundings and proximity in time. But for the 'world as a whole' priority *increases* as the time horizon gets longer. For the two categories of 'Friends, acquaintances and neighbors' and 'St. Petersburg' the priority given drops sharply beyond ones own lifetime. This should not be surprising as for children, grandchildren and future generations it is more likely that it will be ecological issues concerning the whole of Russia and for the World that are of increasing concern.

Table 1.
Table of responses of Meadow s test.

SPACE TIME	Today and closest time	Next several years	Your lifespan	Children's lifespan	Lifespan of grandchildren and great grandchildren	∑
World	28	29	36	44	41	178
Russia	37	33	40	42	31	183
St.Petersburg	41	34	34	16	12	137
Friends, acquaintances and neighbours	72	64	58	13	8	215
My family and myself	192	145	122	104	64	627
∑	370	305	290	219	156	

For this study, we were also interested in the degree of significance of the "World"" parameter in the long-term, in "children's lifespan", "lifespan of grandchildren and great grandchildren". We should note that this area is far from having the last place (10 and 11 places out of 25) in determining the areas of interest and significance of the interviewed. This can be indicative of the demonstrated medium-dominant attitude to the distant future, and in the interest expressed concerning the state of the world left to children, grandchildren and great grandchildren. These results partly confirm previously performed work and correlate with the data of other authors (perhaps put in some references here) regarding the fact that potential ecological risks develop gradually and the final result may become noticeable only in future generations of a population, or after several years of the ecosystem's functioning. The revealed emphasis on the present time and nearest spaces can explain a lack of people's awareness of the relevant problems connected with ecological risks, and a lack of responsibility for making mature and timely decisions.

We can represent this using an analogous diagram to that of figure 1 of Meadows et al. (1974). This is shown below:



This diagram uses different shades of grey to represent the data in table 1, and is a version of figure 1 using shade rather than number of crosses. It is produced using the transparency feature of Microsoft PowerPoint. The bottom left cell is allocated a transparency of 0%, and the other cells are scaled accordingly, so that the top right cell, for example, is given a transparency of (41x100/192) = 21,35% . All cells are of equal area, but area is not meaningful here, as we dot use a numerical scale for either categories of time, or of closeness of space and relationship. As most responses are for the bottom (me and my family) row, it is rather hard to detect much change in the rest of the diagram, except for St Petersburg and neighborhood in the time span of children's lifetime and far future. For the long term, ecological threats to the whole of Russia and the world matters more than for the immediate vicinity. This finding, that ecological value may increase with distance rather than fall, is supported by other research, such as that of Boniauto et al. (2002) and Ahmed, and Gotoh (2006) who find that, contrary to what might be expected, valuations of environmental assets appear to increase rather than decrease with distance. However, here there are two rather different conceptions of distance. One is that of geographical distance, the other, closeness of personal relationship.

4. The Significance of Ecological Risks

The research undertaken into the perception of ecological risks revealed that from the respondents' point of view the most relevant ecological risks are:

- for their own life and health: terrorism, nuclear waste, motor transport accidents, increased level of radiation, drug abuse;
- the most menacing risks for nature existence are: atmospheric pollution, nuclear waste, sewage disposal, destruction of forests.

This choice can be accounted for by the significant social component, their local and regional manifestations as well as a distorted perception of the data concerning ecological risks. Because of the distortion of probability evaluations, risks characterized by low probability of the events, but bad consequences, are perceived as more menacing ones compared to the risks conditioned by events with high probability but relatively moderate consequences. For this reason, public opinion tends to exaggerate the danger from using nuclear reactors, and of nuclear waste, increased radiation level, and terrorism.

To identify the significance of each ecological risk being researched we conducted a comparative analysis (Table 2). Thirty two ecological risks had a definite difference in perception of their significance for people and nature. It is noteworthy that such regional and global risks as, for example, refuse dumps, sewage disposal into rivers and lakes, soil erosion, soil pollution and depletion, use of mineral fertilizers, atmospheric pollution, global warming, ozone layer destruction, extinction of species, destruction of forests, depletion of resources, overpopulation etc. were evaluated by the respondents as insignificant, based on a high level of statistical significance, for their own life and health.

Table 2.: Comparative analysis of the significance of the perception of ecological risks for a person and nature.

Ecological risks	***Average points for***		**p**
	a person	***nature***	
LOCAL RISKS			
1. Smoking	**5,49**	**3,66**	**p<0,001**
2. Using drugs and psychoactive substance	**6,38**	**3,31**	**p<0,001**
3. Presence of toxic substances in food	**6,18**	**4,05**	**p<0,001**
4. Dangerous sex	**5,45**	**2,26**	**p<0,001**
5. Using special additions to food	**3,15**	**2,34**	**p<0,001**
6. Obstruction, increase of rubbish and garbage in city environment.	**5,43**	**7,35**	**p<0,001**
REGIONAL RISKS			
1. St. Petersburg atomic power station	**5,62**	**6,52**	**p<0,01**
2. Fires	**5,52**	**7,71**	**p<0,001**
3. High (advanced) level of radiation	**6,38**	**7,10**	**p<0,001**
4. Density (compact) building	**3,40**	**5,31**	**p<0,001**
5. Clearness of drinking water	5,41	4,86	-
6. Dumps (rubbish braw)	**5,01**	**7,26**	**p<0,001**
7. Emissions of polluted water to rivers and lakes	**6,26**	**8,04**	**p<0,001**
8. Terrorism	**7,51**	**3,77**	**p<0,001**

9. Traffic accidents	**6,49**	**3,16**	**p<0,001**
10. Destroy of soil (erosion)	**3,57**	**6,31**	**p<0,001**
11. Pollution of soil (ground)	**4,74**	**7,67**	**p<0,001**
12. Use of mineral manure (fertilizer)	**3,59**	**5,31**	**p<0,001**
13. Decrease in population in Russia	**3,82**	**3,07**	**p<0,05**
14. Overpopulation in St. Petersburg	3,21	3,57	-
15. Pollution of the air in St. Petersburg	5,86	6,33	-
16. Noise and physic-chemistry pollution in St. Petersburg	5,18	5,59	-
GLOBAL RISKS			
1. Nuclear waste	**6,67**	**8,24**	**p<0,001**
2. Atmosphere pollution	**6,21**	**8,29**	**p<0,001**
3. Nuclear energy	**5,45**	**7,00**	**p<0,001**
4. Global climatic warming	**4,35**	**6,60**	**p<0,001**
5. Destroy of ozone layer	**5,22**	**7,00**	**p<0,001**
6. Disappearance of bioversity (species)	**4,83**	**7,68**	**p<0,001**
7. Degradation of ecosystems and landscapes	**4,92**	**7,50**	**p<0,001**
8. Pesticide	5,52	5,24	-
9. Natural catastrophes (such as earthquakes, floods, forest fires etc.)	**5,66**	**6,69**	**p<0,01**
10. Annihilation of forests	**5,22**	**8,01**	**p<0,001**
11. Exhaustion of resources	**4,78**	**6,93**	**p<0,001**
12. Overpopulation in the world	**3,63**	**5,53**	**p<0,001**
13. Pollution (warm, electro-magnetic, radiation)	**5,53**	**7,34**	**p<0,001**
14. Acid rain	**4,78**	**6,87**	**p<0,001**
15. City Smog	**5,60**	**6,46**	**p<0,001**

The results indicate that there is an insufficiently clear range of the interrelations showing an understanding of the interaction of the "man-nature" system. These trends relate to man's focus of attention on his own problems and a consequent neglect of the risks relate to the real ecological threat. This can be connected with alack of desire to become aware of existing dangers, and with the effect of the mechanisms of psychological defense that individuals have. In our opinion, these ideas reveal the mythology currently existing in much of modern society that man is in a separate position relative to the environment and has practically no connections with it in everyday life. That is, the obtained data indicates a lack of identification of respondents with the natural world. This makes it possible to define the type of the ecological consciousness of the population studied as being an anthropocentric one. Thus, the two questionnaires we used in the research supplement each other revealing the picture of attitude to ecological risks in urban surroundings. Being residents of the urban environment, respondents are characterized by an indifferent attitude to nature. Their lack of identification with nature may be connected with the prevailing attention to local problems, as well as with the relative satisfaction with the ecological state of their place of residence, and acceptance of the existing order of things. The semblance of lack of ecological problems in the place of residence is, in its turn, a consequence of concentrated attention on the current moment, and the opposition of one's own needs against the needs, and well-being, of nature and a neglect of ecological risks. As we have already mentioned, such a position is that of anthropocentrism.

In our opinion, a perception of ecological risks is essential for the formation of ecological conscience. A subjective perception of risks can be both a mechanism, and, a prerequisite for formation of people's conscience and behavior in general, and those of Russian people in particular.

5. Conclusions

A resident of modern Russia who has been through all the crises of his country is still under the impact of social, economic, political, ecological and other risks. Life instability, a huge number of unsettled difficulties at the local level, in most cases, narrows life down to on-going problem-solving regarding people's own lives and health. Thus, survival has the top priority. But a long period of stress lowers the adaptative forces of the organism and blunts interest and attentionto relevant problems of everyday life. Only those which are regarded as not being tedious retain appropriate attention. This desire to ignore relevant problems can be considered to be the mechanism of psychological protection when it is hard to remain in a situation of a prolonged stress.

Ecological risks, as well as other ones, are basically perceived as a total threat, the facing which man feels weak and helpless, and so does not want to think about them. Moreover, due to the seeming priority of social and economic problems, ecological risks are unfortunately not yet singled out into a separate category which is significant for people's own lives.

As we have seen, the degree of the respondents' satisfaction with the ecological state of their place of residence differs little between those satisfied and those dissatisfied (46.48% and 53.52%). In the case that there were a higher percentage of dissatisfied residents of the city, then awareness of the real ecological threat affecting every person in the society could start changes in the outlook on life, and attitude to the management of the natural world. In our opinion, the actions that are currently existing take place at the level of criticism, rather than that of behavior.

We think it appropriate here to draw a parallel with the researches of Carl Rogers in the field of psychology of health and, specifically, with his model of "Guarding Motivation", (1999)). The following factors are a condition of forming motivation for a healthy lifestyle:

1. Presence of a real threat, that is awareness of the existing real threat to one's own health. Information is quite essential here.
2. Feeling of one's own personal vulnerability to the threat and being aware of one's own health problems both somatic and psychological.
3. Ability to stand up to the threat. This may include quite simple actions related to this opposition.
4. Belief that these actions will be effective. This may include support on the part of the community and close people.

This model seems interesting as, in our opinion, it has much in common with the process of ecological conscience formation. Correlating the results of the research with the present model we can suppose that Russian society is now at the first stage when the presence of a real threat,, primarily to man's health, is insufficiently perceived. Due to this one can hardly expect any changes in people's conscience and behavior.

Thus, the most topical issue, in our opinion, is the issue of identification of ecological risks as a separate category and the search for ways to make it personally significant. It is only through this approach that the existing ecological conscience can be changed and turn human societies from its own immediate needs towards the needs of nature, replacing an anthropocentric position by an eco-centric one, and thereby improving the whole quality of life of both individuals and mankind in general.

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AGENTS OF SUSTAINABILITY AND ISSUES IN IMPLEMENTATION OF SUSTAINABILITY PROJECTS

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Pressure on the environment makes it imperative that Turkey changes the way it lives and interacts with the environment. Economy of means, and priorities in the allocation of resources for development is also relevant for sustainability. For the sake of economic development and sustenance of livelihoods in the short run damage to the environment is a price paid in the long run.

SUSTAINABILITY is the search of means for the attainment of a mutually agreed quality of life within limits of possible resources. Initiated as an adjunct to economic development, it was seen that for economic and ecological sustainabilities, the social agent's role in sustainability projects was crucial; SOCIAL SUSTAINABILITY was the initial and necessary condition. Secondly a global project had to be reinstated in rapport with specific geographies and different people; becoming local, cultural, experiential and situational.

Turkey's interest in the paradigm is meager. Deemed to be deceptive, burdensome, ineffectual, unjust or delimiting, etc. absence of programs, little knowhow and legality coalesces into a path little travelled. Paradoxically, specific SPs themselves are needed to transcend normative, theoretical stances and biases.

So it is important to understand the problems between the social agent and institutions for a sustainable future.

Agents of Sustainability and Issues in Implementation of Sustainability Projects

1.0 Introduction

The pressures on the environment due to urbanization and industrialization make it imperative that Turkey joins the majority of believers/visionaries or the committed to make a difference in the ways we live and interact with the environment both social and physical. Economy of means, and priorities in the allocaüon of resources for development as a developing nation is yet another important consideration why sustainability projects (SP) are relevant (the recent figures on energy imports in Turkey indicates the crisis already here: 80 % of oil, 100% of natural gas, and a major part of coal is imported). Ironically enough the developed nations are more intent on making their cities sustainable, thus aiming to raise the quality of life. Moreover, an unfortunate aspect of SP in underdeveloped/developing countries is that for the sake of economic development and sustenance of livelihoods in the short run the damage to the environment is a high price to be paid in the long run (Keleş, 2006).

This presentation will dwell on the delineation of the agents of sustainability, specifically the role of the individual and his/her position in relation to the implementation of sustainability projects. Launched as a global movement in 1987 with the publication *Our Common Future*, the trajectory of SUSTAINABILITY can be described as the search of means for the attainment of a mutually agreed quality of life within the limits and conditions of possible world resources. Initiated as an adjunct to economic develepment, its ecological imperatives were recognized, and furhermore it was seen that for the sustenance of economic and ecological sustainabilities, the social milieu/agent had to be included and his/her role in sustainability projects had to be understood. Thus a first premise is that SOCIAL SUSTAINABILITY (SS) as a process is accepted as the initial and necessary condition for any discourse on sustainability. SS has to include social, cultural values and issues and solidarity on one hand, subsidiarity and governance policies for the achievement and continuity of SPs on the other. According to Sue-Mot, SS is problematic because there seems to be less consensus on what "social issues" are and more contention surrounding "social impacts", compared to environmental and economic issues. The future is also poorly covered in terms of intergenerational equity (2004). A second premise of the discourse is its spatialization: a global project has to be reinstated in rapport with specific geographies and different people thus becoming local, cultural, experiential and situational. The Agenda 21 of the Rio Declaration (1992) was effective as an action program in this process, paving the way for the establishment of Local Agenda 21s that aimed to reach the smallest groups in all countries, through a variety of organizations. While traversing from the global to the local seems to be successful as a matter of scale in the spatialiazation of LA 21s, the possibility of achieving a *network* of actions for wider concerns of the environment and urbanization need to be problematized, and as Harvey reinstates, success of the local, as response of the body may not be able to counteract larger issues (2000). As an example in point, it may be possible to cite the workings of LA 21s in Bursa where issues of urbanization have not been handled so as to save the Bursa plain from excess urban development, or Lake Apolyont (Uluabat) from pollution (2003 Local Agenda 21 Turkey Outstanding Examples).

A general interrogation of SPs in Turkey elicits a meager interest in the paradigm both in the academia and media, in government, NGO's or individuals who are expected to be the stakeholders of SPs. It is deemed to be deceptive or oxymoron by some, burdensome by others, ineffectual at most, unjust or delimiting for developing nations, etc. In short, absence of programs, little know- how, implementation, and legality coalesces into a path very little travelled. Paradoxically it is the specific SPs themselves that are needed to transcend the normative and the theoretical or the ignorance, and which will make sustainable urban planning and design a reality (vanVliet, 1996).

Although, national governments in Turkey inserted sustainable development into the 5-Year Development Plans, familiarized with it through the EU Programs, and participated in the 1992 Rio Declaration, even winning a best prize at 2002 Johannesburg Summit for one of the best implementation programs of municipal initiative, it was not enough to fuel the engines of sustainable development. Following Habitat II in Istanbul (1996) the Turkish Local Agenda 21 Programs have been initiated and supported by IULA-EMME (International Union of Local Agendas and Eastern and Middle Eastern Regions founded in 1997) which had already situated its Middle East and Western Asia Organization (UCLG-MEWA) in Istanbul in 2004, collaborating with United Cities and Local Governments. It is advisable to trace its activities to date (April 2006) through the Progress Report No. 8 under the title "Localizing the

Millenium Development Goals and WSSD Plan of Implementation through the Turkey Local Agenda 21 Governance Network". Consequently the institutional network of the general action program (Agenda 21) has reached Turkey to start joint ventures of municipalities and NGO's, and also with direct involvement of citizens on the basis of subsidiarity, yet the pace of participation has been meager.

In reiteration of the 1992 Earth Summit the main issues of Agenda 21 are : 1. Climate change (energy use and pollution), 2.Unequal distribution of wealth and social inequalities, 3. Loss of biodiversity through loss of habitat. LA 21 Action Plans aim at SPs which are economically, environmentally (ecologically) and socially viable, and where the environment factor is at the forefront. Within this general framework the initial steps to be taken are twofold: 1. An inventory of and consensus on present situation in the specific urban realm with problems and potentials as well as its economic and social ramifications, and 2. The procurement of a common future vision for the area's sustainable development on the basis of a consensus of stakeholders involved. The 1994 Aalborg Amendement which has initiated the movement of European Towns and Cities Towards Sustainability also required that the LA 21's collaborate with municipalities on programs which are basicly environment oriented. However LA 21 Action Programs in Turkey have been scarce, with bottlenecks throughout the process and less environment targeted; although there seems to be consensus and decisiveness on participation and involvement in urban issues in terms of the individual agent, there is reluctance on the side of local authorities in terms of action (Emrealp, 2005).

So it is important to understand the issues between the agent (the individual) and the action programs (Local Agenda Programs) which need the mediation of local governments, and discuss the prospects for furthering interaction to produce policy-relevant approaches for supporting a sustainable future in an urbanizing world.

2.0 Theoretical Endeavors Behind Social Agency

Before venturing into a study of LA 21 Programs, which may be accepted as a generic force of action for sustainability projects at local scales, it would be appropriate to put forth a discussion of *locale* (my italics) meaning "a locality, especially with reference to some characteristic feature" that can support spatiality in any discussion of SPs. Analysis of local actions (generation of visions) can be approached via a theory of *place,* space and environment. There is already considerable research deployed in the study of sustainability with explorations into identity, attachment, cohesion in places (Moser, 2002, 2003; Enric, 2002; Sancar, 1994; Stedman, 2002; Uzzel, 1996, 2002) where the behavior of the social agent is under scrutiny. Such theoretical endeavors may be expected to clarify and justify, strengthen achievement and success of LA 21 programs.

The other approach implicated in a discussion of meanings of place, (or locale) is the holistic debate in social, cultural and literary theory triggered by "an emergent global capitalist culture on one hand, and the reassertion of all sorts of reactionary as well as potentially progressive 'militant particularisms' based in particular places on the other, coupled with a seemingly serious threat of environmental degradation" (Harvey, 1996, 44). According to Harvey if the "current rhetoric about handing down a decent living environment to future generations" is to be meaningful, we need "to invest now in a collective and very public search for some way to

understand the possibilities of a just and ecologically sensitive urbanization process under contemporary conditions" and "to discuss possible futures in a rapidly urbanizing world of uneven geographical development" (1996, 438). To translate this discourse of social process to spaces of power, material practices, institutions, beliefs and social relations is where practical politics begins. The political economy or cultural politics of place is more important now than in the past, firstly because place has been rediscovered as an object of discourse, and secondly because the time-space compression and other changes occuring as a result of capital accumulation threatens the security of places, causing "a search for alternatives, one of which lies in the creation of both imagined and tangible communities in place. The issue of how to create what sort of place becomes imperative for economic as well as political survival", and "every single one of us has agency with respect to it" (326). If the intentions of local agendas are to be understood and activated, it would be fruitful to treat them as a process for social change where the milieu of change is the city and the process is urbanization. Urbanization has to be viewed within a tirilogy of historical-geographical materialism accompanied by a discourse of the environment (nature) and environmental justice. The theoretical perspective of historical-geographical materialism includes five conceptual issues essential to understanding contemporary urbanism : 1. Social action, 2. Globalization, 3. Community, 4. Ecology, 5. Uneven geographical development (Harvey, 1996).

According to Harvey, urbanization in the 21st. Century is about how space-time, environment and place will be produced with what social processes and with what effects. Emancipatory, egalitarian and ecologically sensitive politics will produce urban forms that are very different from those produced under continuous capital accumulation. "Alternative anti-capitalist possibilities are to some degree already present, even though they are the subject of acute contestation and struggle between factions and classes pursuing radically different interests...Intensifying contradictions within a rapidly accelerating and often uncontrolled urbanization process create all sorts of interstitial spaces in which all sorts of liberatory and emancipatory possibilities can flourish" (1996, 420). (Yaylak Local Agenda 21 may be a point in discussion regarding the above.)

It is important to note that urbanization is located in the field of social action and has to be reunderstood as a "process" the outcome of which is the "thing"- the city. In the same vein sustainability-ecological projects need social relations to initiate and manage them. The style of thought presented in a dialectical approach states that : 1. "processes are more fundamental than things, 2. processes are mediated through the things they produce, sustain and dissolve, and 3. permanences produced (including ways of thought, institutions, power structures, and networks of social relations as well as material objects) frequently function as the solid and immovable bases of daily material existence". According to Harvey, this is "...a radical break with late-nineteenth-century thinking as well as with much of contemporary architecture and social science, in which the dominant view, in spite of all the emphasis on social relations and processes, was and is that the city is a thing that can be engineered successfully in such a way as to control, contain, modify or enhance social processes" and where the problem of intricate social processes is reduced "to a matter of finding the right spatial form" (418). However Harvey's negation of spatial determinism does not exclude all discussions of the city or Utopia but considers the level of urbanization processes as being fundamental in any construct. For him "(a) Utopianism of process looks very different from a Utopianism of fixed spatial form" (419).

The discourse above supports the reification of LA 21 as a model agency for implementing SPs, because of their adoption of action through social agency as the necessary condition; and which can be translated into community involvement and participation. As such *Local Agenda 21 Planning Guide: An Introduction to Sustainable Development Planning* and the *Turkish Local Agenda 21 Handbook* give a complete presentation for the establishment, organization and implementation of LA 21 as a policy mechanism; here, some issues of commitment and implementation and the nature of social agency in Turkey will be highlighted against a short background of institutional develepments regarding SD.

3.0 The Institutional Background of Social Agency

Thhe institutional consensus on issues of environment took a start in 1972 with the Stockholm Conference on the Environment, followed by Habitat I (1976), and establishment of the World Commission on Environment and Development by the United Nations (1983) to be followed by the Brundtland Report, *Our Common Future* (1987), World Summit in Rio (1992), Habitat II (1996) in Istanbul, Johannesburg Summit (2002). The Turkish community confronted the issue of sustainability in 1989 through a conference on SD in Turkey arranged by the Turkish Environment Foundation (Kural 2003). Later, *Turkey National Report and Plan of Action* was presented to Habitat II, and *Turkey National Report on Sustainable Development* was presented to the Johannesburg Summit as official documents. The 6th., 7th., and 8th. Five- year Development Plans also contain commitment measures to issues of sustainability. The UN Millenium Declaration (2000), globally accepted as an important document for " 'a more peaceful, prosperous and just world' challenging globalization to become a positive world force and not an unequal and unjust geographical development" was also signed by the Turkish government.

According to Emrealp, Local Agenda 21 is crucial in implementing the Millenium Development Goals at local levels, and the third phase of the Turkish Local Agenda 21 Program is expected to focus on localizing these goals. The goals identified and targeted to be accomplished by 2015 are as follows (2005, 24):
Goal 1: Eradicate extreme poverty and hunger.
Goal 2: Achieve universal primary education.
Goal 3: Provide gender equality and empower women.
Goal 4: Reduce child mortality.
Goal 5: Improve maternal health.
Goal 6: Combat HIV/Aıds, malaria and other diseases.
Goal 7: Ensure environmental sustainability.
Goal 8: Develop a global partnership for development.

Another major institutional agency in LA-21 implementations is the Aalborg Charter launched by the European Sustainable Cities and Towns Campaign under the auspices of European local governments and which paved the way for the preparation of the European LA-21 Planning Guide by ICLEI. This general framework provided by the Charter rests mainly on the establishment of participatory platforms at the city level in which municipalities play a dominant role, and a strong inclination towards issues of the environment prevail (Emrealp, 2005, 46). The Aalborg Charter consists of the following 10 commitments including 50 objectives, and a first European assessment is expected to take place in 2010 (www.la21turkey.net):

1. Governance: energizing decision making processes through increased participatory democracy.
2. Local management towards sustainability: implementing effective management cycles, from formulation through implementation to evaluation.
3. Natural common goods: assuming responsibility to protect, to preserve, and to ensure equitable access to natural common goods.
4. Responsible consumption and lifestyle choices: adopting and facilitating the prudent and efficient use of resources and encouraging sustainable consumption and production.
5. Planning and design: assignning a strategic role to urban planning and design in addressing environmental, social, economic, health and cultural issues for the benefit of all.
6. Better mobility, less traffic: recognizing the interdependence of transport, health and environment and promoting sustainable mobility choices.
7. Local action for health: protecting and promoting the health and wellbeing of citizens.
8. Vibrant and sustainable economy: creating and ensuring a vibrant economy that gives access to employment without damaging the environment.
9. Social equity and justice: creating inclusive and supportive communities.
10. Local to global: assuming global responsibility for peace, justice, equity, sustainable development and climate protection.

The implementation of LA 21s in Turkey started in 1997 with support from UNDP and coordinated by IULA-EMME and decision of the Council of Ministers, with a project entitled *Promotion and Development of Local Agenda 21s in Turkey,* continued by *Implementing Local Agenda 21s in Turkey* in 2000 in the second phase, and three interrelated projects as of 2003 in the third phase: *Establishing a Sustainable Network to Promote Local Democratic Governance in Turkey*; *Enhancing the Role of the Women and Youth in Local Partnerships and Networking for Transparency*; and *Localizing the UN Millenium Development Goals and WSSD* Plan *of Implementation through the Turkey Local Agenda 21 Governance Network*. By 2003 partnership of over 50 cities encompassing 10 Metropolitan Municipalities and 3 Special Province Administrations was achieved, and as of 2006 the number of partners are around 60. Participatory mechanisms and platforms include City Councils, Working Groups, Women Platforms, Youth Platforms, and Special Groups. LA-21 City Councils, unique to the Turkish case, are crucial in bringing central government, local government and civil society into collaboration, and currently operate in around 40 cities.

Local authorities are expected to support the activities and decisions of CC and accomodate them in their programs; the establishment of CC "for developing a common vision for the city and a sense of citizenship, and realizing sustainable development...transparency, accountability, participation and subsidiarity" as the main city-wide participatory platform has been included in Article 76 of the new Law on Municipalities along with other significant Articles and is expected to be approved by the end of 2006 (IULA-EMME, 10). Representatives of professional chambers, trade unions, universities, political parties, NGO's, etc. are expected to participate, and their recommendations to be discussed in Municipal Assemblies.

4.0 Conclusion

Considering the number of LA 21partners currently involved, from over 2500 local governments, the successfull institutionalization of such a social agency seems to go unidentified and consequently underused by the public in Turkey. While the national government can be expected to give legal and financial support and promote the launching of LA21 in all local authorities, as has been achieved in UK in 1997 (Lucas, et.al., 14), the role of national and local media, interest and responsibilities of universities and professionals partaking research in this field are crucial. According to the Çankaya Municipality LA 21 Secretary General, the sustainability of the LA21 was itself a problem under changing political circumstances and administrations. Other community actions such as TODAM(Center for Community Solidarity) of Çankaya Municipality, or the Turkish Union of Healthy Cities e.g. seemed to be options where the local government felt more freedom of action in contrast to a more rigid structure, and formalities of LA21s. The major issues effective in the workings of the LA21s fingermarked were the fluidity of the political environment, the weak cultural infrastructure which limited participation, the inadequacy of the power structure of LA21s in decision making, and financial inadequecies in program implementation, arising both from municipality budgets and LA21 budgets (Candan, 2006).
There may be individual and independent SPs that go unrecognized, with or without institutional support that would increase their effectiveness, the lack of an integrated network and tools for sustainable urban development assessment is another deficiency which prevails in the implementation SPs. The SUE MoT project as part of a Sustainable Urban Environment research programme in UK has on-going research with regard to sustainability tools(ST) and their development, in order to provide a more sustainable framework for urban development. The tools fall into the categories of urban planning, design, rating systems (for buildings), Life Cycle Assessment tools and infrastructure. Although the tools assessed is not held to be inexhaustive, it covers 78 of the most popular and efficient ones used up to date around the world. Of these the two most developed as STs are urban planning and building rating systems categories (www.sue-mot.org.uk).
STs of assessment are necessary because they are expected to help stakeholders understand and act on government policy, yet which agents are going to be responsible for which tools needs to be understood; and the role of the individual in assessment has to be resolved, and that is why social sustainability needs to be understood within environmental and economic sustainabilities. Participation and agency seems to be eschewed, and how to approach it seems to be unknown. We need to take note of existing organizations around us and start operating them so that we can eventually strenghen them. Advocacy of professionals and universities for initiating actions and formulating visions can be another consideration. In today's Turkey many dichotomies of the legal and illegal, the literate and the illiterate, the environmentally conscious and unconscious, etc., may exist, yet it is clear that there is an increase in public opinion and reaction that finds voice in the media or NGOs or in the actions of everday life, probably due to both a downward trajectory in the quality of life and a rise in expectations. Unfortunately local goverments are unaccustomed to these actions by people; showing hostility, repression, inattendance, or even force, and are reluctant to accept that todays society needs to be in governance, and that a top-down governing is neither just or superior.

Grassroot movements are underestimated, suppressed and sometimes not approved even by the public at large, whereas this is an energy shown by a modernizing community and needs to be channelized into structured iniatives of citizens whether they be/are platforms, or NGOs or individual endeavors; and they have to be brought into direct working relations with local authorities on the basis of subsidiarity. In this respect LA 21 can be a fitting model, already here for mediating/initiating these relations to start/develop and may even transcend the objectives of sustainability for a wider perspective of a just and equitable society by being a model for other community based organizations; which also finds voice in a study conducted in UK on the pro's and con's of LA21s (Lucas, et al.).

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STUDENTS' USAGE LEVEL OF ENVIRONMENTAL ATTITUDES AND USAGE LEVEL OF ENVIRONMENTAL COGNITIVE KNOWLEDGE IN FIFTH GRADE OF THE TURKISH BASIC SCHOOLS

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In this study students' usage level of cognitive knowledge in the fifth grade of the basic school; students' attitudes knowledge towards the fifth graders science and environmental education goals were examined. 588 Turkish students in 16 schools were assigned randomly. Data were collected in the 2004-2005 academic year. In order to determine students' usage level of cognitive knowledge a test was developed. The test was scored out of 29 points. Those scores were used as row scores as well. In order to determine students' usage level of attitudes the scale was developed. The scale was a Likert type one to three with 27 items. Scores obtained through the attitude scale were also used to determine the relationship between students' usage level of cognitive knowledge. According to the analysis of data; the mean score of the fifth graders in using environmental cognitive knowledge was 55 and the mean score of the fifth graders in using environmental attitudes was 77. Those results revealed that students' usage of environmental knowledge and attitudes had differences. It was emphasized that especially starting from basic education schools, in order to increase students' environmental cognitive knowledge level; the quality of science instruction should be improved. To do so, firstly according to students' needs, instructional and behavioral objectives should be determined, then learning environmental parallels with behavioral objectives and furnished with effective and rich learning materials and strategies should be designed. Additionally, the Professional quality of teachers who will facilitate such learning environments should be improved through pre and in-service training activities.

Introduction

Humans continue to engage environmental unfriendly behaviors at the individual, corporate, governmental, and society levels. These behaviors contributed, and continue to contribute, to the creation and exacerbation of several environmental problems that might pose serious threats to wellbeing of humans and all living species (Gore, 1993).
The result of the human's unfriendly behavior to environment in the 1990s the environmental issue became a very important theme on international Agenda. This phenomenon, begun the 1970s, is happening because researchers, educators and businessmen perceive that the efficient management of natural resources can bring both positive quantitative (cost savings/financial returns) and qualitative (environmental protection/life quality) results.
But how the society can enjoy these results?

Environmental consciousness

The Macquarie dictionary defines Environmentalism as 'the theory that environmental factors, both physical and cultural, have paramount influence on the development of animals and humans, both individually and socially'. Bramwell (1989) argues that these views were constructed in the mid-nineteenth century, when science replaced the role of religion and the Renaissance belief that the world was created by God for exclusive human use. Subsequently the idea developed that Man is at one with Nature and that He should co-exist harmoniously with it.

Though this theme was taken up by other philosophers (e.g. Heidegger, 1994) it was not until the 1970s that environmentalism really came to the fore. At this time an oil crisis created shortages and economic depression in the West. Together wit other ecologically-oriented sources of influence (e.g. The first 'Earth Day' in the USA in 1970; Ward and Dubos' Human Environment Report at the United World Conference in 1972 and the founding of the 'Club of Rome' prophesying imminent global catastrophes) it brought home the message that energy resources are not limitless and that to survive, Mankind needed to look after 'Gaia'. Soon after, environmental movements and ecological action groups proliferated.

The occurrence of toxic spills, oil spills, nuclear waste, and obvious air pollution has further increased public environmental awareness and emphasized the need for urgent corrective actions (Buttel and Finn, 1974; Lipsey, 1977). More recently, environmentalism has entered the political arena as environmentally concerned 'Green' parties have emerged in the political forum. (E.g. the Green parties in Britain and Germany; the Europe-Ecology in Europe).

The concept of "the environment", on the other hand, has changed over time; early views focused on changing ecosystems ant the impact of various forms of pollution, however the social, economic and cultural dimensions of the environment have been increasingly recognized and the inclusion of sustainable development even more board.

Environmental Education

People have always faced environmental challenges. However, today's challenges seem far more numerous and more serious than in the past. Scientific research has given people a better understanding of the effects of unseen contaminants on the both the environment itself and on human health. People are realizing that they can no longer simply base their perceptions of the quality of the environment on their own understanding, experiences, and senses; the unseen, the unsmelt, and otherwise unsensed contaminants may pose significant risks to the individual. It is with this realization that people are increasingly relying on a variety of sources to provide them with information concerning issues of environmental risks and their avoidance.

Consulting a wider variety of sources for information may initially create some confusion, as there is rarely agreement about the causes of and/or the solutions to environmental challenges. Nevertheless, it is a valuable exercise as people may gain a different perspective on the issue at hand, or a greater understanding of the collective product of large number of unconnected actions which individually may have very little impact upon the environment. By so doing, they will become more aware of the impact that their personal decisions can make upon society as a whole, and more socially responsible when making lifestyle choices. An early sense of social responsibility in children can be developed through environmental education in schools, especially at the elementary level. Environmental education is crucially needed to prepare environmentally literate students who, as future citizens, would play in active role in protecting the environment through making informed decisions and taking environmental friendly actions (UNESCO-UNEP, 1991).

Three goals of environmental education is defined in 1977 in Tbilisi Declaration (UNESCO, 1978) as; it is to enable pupils to deal with natural, social and developed environment, it is to promote the ability to solve problems in complex systems, and to contribute to enable pupils to participate in political life.

Palmer and Neal (1994,33) have argued that "Pupils in school, perhaps at primary level in particular, are fascinated by their surroundings and have tremendous capacity to build upon natural learning experiences that take place with them. Aside from academic debate and jargon, the 'real world' experiences of a wide sample of educators show the vital importance of education in the environment as a prerequisite to a concern for it.

William Stapp, Professor Emeritus at the University Of Michigan School Of Natural Resources, stressed the importance of environmental education, particularly with youth, and its importance in the formal sector.

Şama (2003) investigated Turkish trainee teachers' environmental attitudes. The relationship between the student's attitudes and their gender, departments, grade level, the neighborhood where they lived the longest, their fathers' education level and occupation, and income level of their families was assessed with an instrument developed by the researcher.

Tuncer (2004) investigated environmental attitude of 6th grade Turkish students living in rural and urban areas in Ankara. Results of her study revealed that, there is a significant mean difference between students' attitudes with respect to school district.

No research is currently available on Turkish Basic School students' environmental knowledge and attitudes. Research done in other countries (e.g. Gambro& Switzky, 1992, 1994, 1999; Kuhlemeier et al., 1999; Vlahov & Treagust, 1998) indicated that young adults do not possess adequate environmental knowledge, and that such knowledge was significantly related to students' gender and parental level of education. By comparison, students' environmental attitudes were found to be mostly favorable. Additionally, while the importance of attitudes and values in determining behavior toward the environment is widely recognized, the relationship between such attitudes and values, knowledge and understanding of environmental issues is less well understood (Dillon& Gayford, 1997)

Purpose

This study aimed to assess Fifth Grade of the Basic school students' environmental knowledge and attitudes in the Burdur City, Turkey. The study also explored the relationship between participants' knowledge and attitudes and (a) biographical and (b) academic variables. The following questions guided the study.

1. What are fifth grade of the Turkish basic school students' environmental knowledge and attitudes?
2. Are fifth grade of the Turkish basic school students' environmental knowledge and attitudes related to biographical variables including student gender?
3. Are fifth grade of the Turkish basic school students' environmental knowledge and attitudes related to academic variables including enjoyment of the courses?

Method

Participants

Population and sampling procedure. The population for this study included grades 5 students in basic schools located in the Burdur area, Turkey. All 44 schools in this area have 5 grade students. The population of 44 schools is 1281. For the sampling 16 schools were randomly selected.

Participant students Participants were 588 students, 300 male (51%) and 288 (49%) female. Their ages ranged from 11 to 13 years with an average of 12 years.

Instrument

The researcher complied a two-part questionnaire to asses participants' environmental knowledge and attitudes the questionnaire topics were chosen to align it with environmental topics addressed in the new Turkish Fifth Grade Science and Technology Education Curriculum.

Part I: Assessing Environmental Knowledge Part I of the questionnaire comprises 29 multiple-choice items. Each item presents the respondent with four choices, one of which is considered to be 'correct' For example item 9 ask respondents, 'Which one causes long term ground pollution?' Respondents are provided the four following choices : 'Petrolatum' ; ' Plant waste' ; ' Food waste' ; ' Farm manure' It should be noted that the questionnaire is by no means achievement test in the sense of assessing students' mastery of specific environmental objectives addressed in the Science and Technology Education Curriculum for grades of 5. Rather, the items were chosen to asses participants' knowledge of general environmental topics included in the Science and Technology Education curriculum and/or dealt with in the media. These topics included pollution, solid waste disposal and recycling, energy issues, water quality and quantity, soil degradation, animals and general issues.

Part II: Assessing Environmental Attitude Part II of the questionnaire comprises 27 three-point Likert-type items (agree-unstable-disagree), which aim to assess attitudes. In particular, the items assess respondents' beliefs, affect, and behavioral intentions toward the environment. The remaining items aimed to assess participants' commitment to environmental friendly behaviors. The following are examples of these items:

1. Beliefs: 'Factories have to use filter for their chimney.'
2. Affect: 'It upsets me when I see people use too much water'
3. Behavioral intentions: 'I would be careful to buying recycling notebook.'
4. Commitment to environmental friendly behaviors: "To save energy, I turn off lights at home when they are not in use:'

Establishing the content validity of the questionnaire Three experts in the field of science and technology education examined an initial version of the questionnaire regarding: (a) the adequacy of the environmental topics elicited in the questionnaire in terms of their developmental appropriateness, parallelism with the Science and Technology education curriculum, and representative ness of the most important environmental issues in Burdur; and (b) the accuracy of multiple-choice item stems and appropriateness of distracters. The reviewers had several comments and suggestions for improvement. The items were modified accordingly resulting in revised version of the questionnaire.

Pilot-testing and internal consistency the revised version of questionnaire administered to two 5th grade basic school classes: one (30 students); one (25 students). Also researcher makes interviews with five students from pilot-testing group. After completing the questionnaire, students were asked to comment on any difficulties they faced or ambiguities they encountered when responding to the items. Respondents made several comments regarding difficult terminology, unfamiliar items, and ambiguous questions. The questionnaire items were modified to address student comments, resulting in a final version of the questionnaire. The final version, which was administrated to all participants, had a moderately high internal consistency. The value of alpha Cronbach for Part I of the questionnaire was .77 and that for Part II was .85.

Scoring the questionnaire Part I of the questionnaire was scored by assigning one point to each correct answer. As such, knowledge scores ranged from 0 to 29 points. Part II was scored by assigning 3 points to the most pro-environmental response to each item. For statements representing a positive attitude toward the environment, 3 points were assigned to "agree" 2 to "unstable' 1 to 'disagree'. As for statements representing a negative attitude toward the environment, the scoring was reversed. Thus, the minimum possible score on the attitude section of the questionnaire was 27, and the maximum was 81 points.

Procedure
The first author visited each of the participant schools and secured permission for administering the questionnaire. In each classroom, he informed participants about the purpose of the questionnaire and procedure for completing it, explained that that the items in Part II relate to personal attitudes and do not have one 'correct' answer, explicitly assured students that the questionnaire was not a quiz, and supervised the administration and completion of questionnaire. Participants completed the questionnaire individually and were not permitted to consult their science textbooks or other references. However, they were allowed to ask questions of the researcher regarding the questionnaire items.

Data Analysis
Data were analyzed by using SPSS 11.5 software at .05 intervals. Data analysis included a number of descriptive analysis (frequency, percentage, mean, standard deviation) and inferential analysis (ANOVA, t test, Tukey and Correlation Co efficiency) as well.

Results

Environmental Knowledge

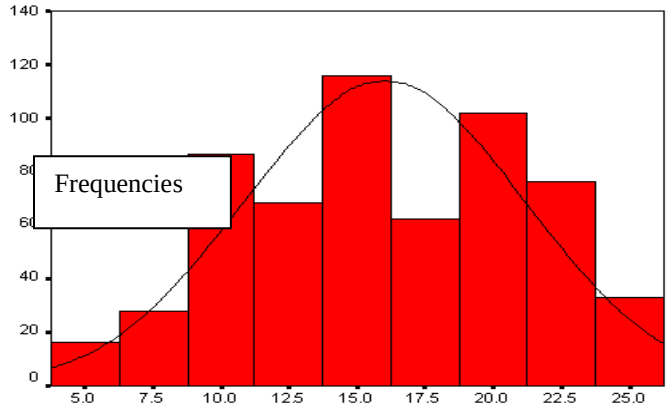
Table 1 presents the total knowledge points for participant. The mean total knowledge scores, of the fifth graders in using environmental knowledge was 55.17 %, reflect less than adequate environmental knowledge. Mean of points is calculated as 16, standard deviations as 5.13. This result is supported by Ersöz's research.

TABLE 1. Total Knowledge scores for participants' grade level

Points/Correct Answers	Frequency(f)	Percentage (%)	Cumulative Percentage
4.00	9	1.5	1.5
5.00	2	.3	1.9
6.00	5	.9	2.7
7.00	2	.3	3.1
8.00	26	4.4	7.5
9.00	14	2.4	9.9
10.00	25	4.3	14.1
11.00	47	8.0	22.1
12.00	45	7.7	29.8
13.00	23	3.9	33.7
14.00	50	8.5	42.2
15.00	39	6.6	48.9
16.00	27	4.6	53.5
17.00	44	7.5	61.0
18.00	18	3.1	64.1
19.00	34	5.8	69.8
20.00	24	4.1	73.9
21.00	44	7.5	81.4
22.00	31	5.3	86.7
23.00	45	7.7	94.4
24.00	16	2.7	97.1
25.00	17	2.9	100.0
Total	587	99.8	
Missing System	1	.2	
Total	588	100.0	

This is especially the case given that the questionnaire assessed participants' knowledge of basic environmental concepts relating to broad topics (pollution, recycling, energy, water, animals, soil, general), which were relevant to participant's everyday lives. Participants' knowledge of the target environmental topics was equally lacking. Finally, the relatively large standard deviations represent a noteworthy aspect of the results shown in Figure 1. Such spread was disparate. In other words, participants' environmental knowledge was disparate. In other words, participants lacked a common knowledge base of the target environmental concepts and related issues.

Figure 1. Total knowledge score range scores for participant grade level



It can be said that fifth grade students reached approximately 55% of goals. There is an accumulation more than one success level, this situations show the differences among student success levels.

To talk about a qualified education, it is expected that students' average success should reach 70%-80%. Yet, in practice, the existence of many components which affect the student and education environment makes it difficult to meet that expectation.

Environmental Attitude

It is seen that attitudes of fifth grade students towards environment changes between the "negative", "indecisive" and "positive" levels. It can be said that students reached the environmental attitude goals as a percentage of 77%. This percentage can be assumed sufficient for qualified education.

From general point of view, it should be considered that, for students' behaviors of teachers, media, groups of the same age, features of people, which are viewed as model has important affects on reaching the environmental attitude goals that take in the curriculum and formation of attitudes towards environment.

Relationship between Environmental Knowledge and Attitudes, and Biographical and Academic Variables

During the search for relationship between Environmental knowledge and gender means and standard devaluations of the point that students got from Part I of the questionnaire are correlated and meaningfulness between success points and gender are analyzed by t-test and transferred to the figure 2.

Means and standard devaluations of the point that students got from Part II of the questionnaire are correlated and meaningfulness between attitude points and gender are analyzed by t-test and transferred to the figure 3.

Figure 2. T-test Analyses for relationship between environmental knowledge and gender

Gender	*N*	*M*	*S*	*Sd*	*t*	*P*
Male	299	15.80	5.28	585	.958	.338
Female	288	16.21	4.95			

Although points that fifth grade students got from the environmental knowledge test do not show any meaningful difference with respect to sex. [t(585)=.958, p>.05] Knowledge of girls (μ: 16.21) is higher than boys (μ : 15.80). Yet, according to the statistical results there is not a meaningful difference between environmental knowledge points and gender.

Figure 3. T-test Analyses for relationship between environmental attitude and gender

Gender	*N*	*M*	*S*	*Sd*	*t*	*P*
Male	299	2.52	.29	585	2.11	.03
Female	288	2.57	.30			

A meaningful difference with respect to gender can be seen in the attitudes of fifth grade students towards environment. [t(585)=2.11, p< .05] Attitudes of girls (μ : 2.57) is more positive than boys. (μ: 2.52) This result can be commented as the existence of relationship between attitudes towards environment and gender.

During the search for relationship between Environmental knowledge and attitudes means and standard deviations of the points that students got from 1st part of questionnaire and 2nd part of questionnaire. Later on variance analysis is made to look at the mean differences.

Figure 4. Relationship between Enjoyment Course and Environmental Knowledge

Statistics Enjoyment Courses	n	M	ss
Turkish	107	16.4393	5.16552
Mathematic	176	15.9602	5.09606
Science and Technology	92	15.8370	5.25875
Social Science	26	16.3077	4.51459
English	51	15.1961	4.90722
Religion	14	15.0714	4.15959
Art	15	16.5333	5.09715
Music	28	13.8214	4.61121
Physical Education	78	16.9872	5.54672

When we examine the figure 4., the lowest group with μ: 13.82, is the students who like Music course in the second place, the ones who like Religion course and English, Science and Technology course, Mathematic, Social Science, Turkish, Art courses comes after, respectively the group that has the highest mean, with μ: 16.98, is the one who likes Physical Education Course.

Figure 5. Relationship between Enjoyment Course and Environmental Attitude

Statistics Enjoyment Courses	N	M	*ss*
Turkish	107	2.5521	*.33355*
Mathematic	176	2.5501	*.28070*
Science and Technology	92	2.5572	*.31912*
Social Science	26	2.4031	*.28657*
English	51	2.5701	*.27368*
Religion	14	2.5291	*.33583*
Art	15	2.6049	*.25571*
Music	28	2.6019	*.22577*
Physical Education	*78*	*2.5218*	*.29805*

When we examine figure 5. The group that has the lowest level attitude points mean with μ: 2.40, compasses of students who like social science course. The students who like Physical Education, Mathematic, Turkish, Science and Technology, English, Music courses follow respectively. The group that has the highest attitude point means with μ: 2.60, compasses of students who like Art courses.

According to these results, a meaningful difference could not be found in terms of the success for the enjoyed courses. This situation can be interpreted as the low relationship between academically personality concept and test results or means of basic school students. The results which are obtained fro the research that matters relationship between academically personality and test points on means, show that the correlation between those two variables is low during the first years of basic school and, increases after the fifth grade.

It can be seen that the relationship between academically personality concept increases with grade and school level. When years that are experienced along in school, events that forms the learning background increases and his/her judgment about this subject, in other words, academically personality concept shows determination. Previous success of student affects the academically personality concept and, academically personality concept also effect the later success.

Discussion and Implications

Consistent with research undertaken in other countries, it seems that countries in which environmental topics have been taught for extensive periods of time are still graduating students with inadequate understandings of environmental topics (Gambro & Switzky, 1999).

Apparently, it is not enough to develop and implement a curriculum in which science and technology education is prominently represented. In this case we might be succumbing to an ‘improved inputs syndrome’ in which educators falsely believe that improving inputs will necessarily improve educational outcomes. Indeed, a curriculum may provide teachers and students with lots of information, but present information in ways that do not foster creativity, interest, and student involvement, resulting in lack of motivation and little meaningful learning. Moreover, in the Turkish case, teacher-training activities associated with the new science and technology curriculum tended to be decontextualized and focused on presenting information about the environment and the nature of good teaching. Training activities were

not connected to what actually happens in the classroom and lacked the continuous support of experts in the fields of education and the environment. Specifically, what is needed is not only to provide Turkish teachers and students with an appropriate curriculum. Rather, quality instructional materials, focused training, careful monitoring, and classroom support during implementation should be furnished as well. With these latter components missing, Turkish students will continue to have inadequate understandings of environmental concepts and issues.

Similar to previous research findings (e.g. Gambro & Switzky, 1994), participants' with 'more educated' fathers, who consequently enjoy richer home environments with more access and exposure to scientific and environmental resources, had significantly higher environmental knowledge scores. The finding that participants' knowledge was not related to the mothers' educational level could be explained by the fact that in a relatively male-dominated Middle Eastern Lebanese culture, the household 'educational tone' is more likely set by the father than by the mother. Regarding the relationship between gender and environmental knowledge and attitudes, prior research findings are generally inconsistent (see e.g. Eagles & Demare, 1999; Vlahov & Treagust, 1988). The present finding that grade 10 females had significantly higher knowledge and attitude scores than males cannot be explained given current research findings.

Consequently, this is an area open for further investigation. Finally, as with previous research (e.g. Gambro & Switzky, 1994; Kuhlemeier *et al*., 1999), the rather low correlations between participants' environmental knowledge and attitudes suggest that the effect of knowledge on attitude and behavior is not direct, but mediated by several factors. In contrast, the moderately

High correlations between environmental behavior, intentions, and affect suggest that the latter could serve as determinants of proper environmental behavior. These findings support the claims of the theory of reasoned action.

The next step for related research in Turkey would be to use more intensive research tools, such as open-ended questionnaires and individual interviews, to probe Turkish students' environmental attitudes and knowledge in more depth and identify students' naive environmental conceptions. Furthermore, research efforts should focus on understandings the correlates or precursors of environmental friendly behaviors among students in a country where environmental education is a relative newcomer.

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THE EFFECTIVENESS OF ENVIRONMENTAL EDUCATION ON ENVIRONMENTALLY- SENSITIVE BEHAVIORS

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The purpose of this study is to measure the impact of environmental knowledge on environmental behaviors of university students. For this purpose, a questionnaire with two parts; part one, for the measurement of environmental knowledge and part two, for the measurement of environmental behaviors was designed. This questionnaire was tested on a sample of 33 Gazi University Vocational School of Health Services, Environmental Health Program students (GÜ-SHMYO) and 33 Ankara University, Faculty of Educational Sciences, Social Sciences Education Dept.(AÜ-EBF) year one students as a control group. The reason behind to chose such 2 groups of students was to differentiate the students who are subjected to environmental courses (GÜ-SHMYO students) and who are not (AÜ-EBF students).

It is found that, students have environmental knowledge and sometimes behaving in an environmentally significant way. When the environmental knowledge and behavior scores of both groups are compared; there is no statistically important difference in terms of environmental knowledge between the groups. However, there exists statistically important difference among the behaviors of both groups ($t=2.04$; $p<0.05$). Students who had taken environmental lectures are found behaving more environmentally way (mean 1.30) than the others (mean 1.18).

In the second phase of the study, the statements prepared to measure environmental knowledge and behavior were analyzed one by one for all students in general and each of the items were compared for two groups of students by t-test.

Introduction

The main purpose of this study is to measure the environmental knowledge and behaviors of university students and to check if there exists a relationship between those two variables namely the environmental knowledge and behavior. For this purpose, a questionnaire with two parts; part one, for the measurement of environmental knowledge (15 items) and part two, for the measurement of environmental behaviors (14 items) was designed. This questionnaire was tested on a sample of 33 (all of the year one students) Gazi University Vocational School of Health Services, Environmental Health Program students (GÜ-SHMYO) and 33 (randomly selected) Ankara University, Faculty of Educational Sciences, Social Sciences Education Dept.(AÜ-EBF) year one students as a control group. The reason behind to chose such 2 groups of students was to differentiate the students who are subjected to environmental courses (GÜ-SHMYO students) and who are not (AÜ-EBF students).

Gender and Environmental Knowledge and Behaviors

The sex of the students was 23 males (34.8 %) and 43 females (65.2 %). The ages of the students range between 19-21. When the impact of gender is examined, the means for gender did not differ significantly from each other for environmental knowledge ($t=1.290$, $p>0.05$) and behavior ($t=1.276$, $p>0.05$). The literature survey indicated that, some researchers (Arcury, 1990; Stern et al,1993; Tarrant and Cordel, 1997; Zelezny et al, 2000) discussed the relationship between environmental, knowledge, behavior and gender and concluded that, the relationship between these variables is weak and inconsistent. In some studies there may be a tendency for men to express greater support for environmental behaviors (Scott and Willis, 1994), whereas in some studies opposite results may be found showing women as more environmentalist (Stern, 1993; Tarrant, 1997; Loges and Kidder, 2000).

Descriptive Analysis of Environmental Knowledge and Behavior

Table 1. Descriptive Statistics of Environmental Knowledge and Behavior

		N	Mean	Std. Deviation	t	P
Environmental Knowledge	Vocational School of Health Services (Environmental Health Program)	33	1.028	0.155	0.652	0.517
	Social Science Education	33	1.001	0.176		
	Overall	66	1. 014	0.165		
Environmental Behavior	Vocational School of Health Services (Environmental Health Program)	33	1.300	0.225	2.039	0.046
	Social Science Education	33	1.178	0.260		
	Overall	66	1. 239	1.286		

As it can be seen from Table 1, students' mean environmental knowledge and behavior scores were found as 1.014 and 1.239 respectively. That means, students have environmental knowledge and **sometimes** behaving in an environmentally significant way. When the environmental knowledge and behavior scores of both groups are compared; there is no statistically important difference ($t=0.652$, $p> 0.05$) in terms of environmental knowledge. However, environmental behaviors of 'Environmental Health Program' students differs ($t=2.039$, $p< 0.05$) from the 'Social Science Education' students. From Table 1 it can be seen that, students who had taken environmental lectures are found behaving more environmentally way (mean 1.300) than the others (mean 1.178).

Correlation of Environmental Knowledge and Behavior

Table 2. Correlation Matrix of the Environmental Knowledge and Behavior

		Environmental Knowledge	Environmental Behavior
Environmental Knowledge	Pearson Correlation	1	-,049
	Sig. (2-tailed)	.	,698
	N	66	66
Environmental Behavior	Pearson Correlation	-,049	1
	Sig. (2-tailed)	,698	.
	N	66	66

As stated before, one of the notion of this study is to examine the relationships between environmental knowledge and behaviors clarify if respondents having a higher level of environmental knowledge. Although we were expecting, statistically significant positive correlation between environmental knowledge and environmentally significant behaviors as can be seen from Table 2; there is no statistically significant correlation between those two variables. That is, environmental knowledge (indirectly environmental education) is not supported as a significant moderator of the environmental behavior. This might be explained as, students are aware of the environmental problems, the level of their environmental knowledge is quite satisfactory. However they do not internalize the knowledge they have. There is a lack of ethical values which is a useful tool for individuals to adopt their environmental knowledge into their daily routine lives.

Students' Environmental Knowledge

In the second phase of the study, items prepared to measure environmental knowledge and behavior were analyzed one by one for all students in general and each of the items were compared for two groups of students by t-test.

Table 3. Frequency of Responses (as percentage) to each knowledge item

Item: Paraphrase of question	Department	Correct response		False response		Undecided		mean	p
		n	%	n	%	n	%		
1.The 'greenhouse effect' and 'ozone depletion' are, as a matter of fact, the same phenomena.	Environmental Health	12	36.4	21	63.6	-	-	0.363	0.020*
	Social Sciences	20	60.6	12	36.4	1	3.0	0.667	
	Overall	32	48.5	33	1.5	1	50.0	0.515	
2.The 'greenhouse effect' is a result of burning coal and oil.	Environmental Health	25	75.8	4	12.1	4	12.1	1.000	0.011*
	Social Sciences	12	36.4	17	51.5	4	12.1	0.606	
	Overall	37	56.1	21	31.8	8	12.1	0.803	
3.The 'greenhouse effect' causes an increase of the Earth's average temperature.	Environmental Health	29	87.9	2	6.1	2	6.1	1.000	0.350
	Social Sciences	19	57.6	9	27.3	5	15.2	0.879	
	Overall	48	72.7	11	16.7	7	10.6	0.939	
4.Chloroflorocarbons (CFCs) are responsible for ozone depletion.	Environmental Health	28	84.8	2	6.1	3	9.1	1.030	0.126
	Social Sciences	22	66.7	2	6.1	9	27.3	1.212	
	Overall	50	75.8	4	6.1	12	18.2	1.121	
5.Depletion of ozone does not effect people in Europe and Turkey.	Environmental Health	27	81.8	2	6.1	4	12.1	1.060	0.533
	Social Sciences	29	87.9	2	6.1	2	6.1	1.000	
	Overall	56	84.8	4	6.1	6	9.1	1.030	
6.Deforestation adds up to the greenhouse effect.	Environmental Health	29	90.6	-	-	3	9.4	1.094	0.597
	Social Sciences	21	63.6	5	15.2	6	18.2	1.031	
	Overall	50	78.1	5	7.6	9	14.1	1.063	
7.Using high octane gasoline (super) in cars helps to reduce air pollution.	Environmental Health	21	63.6	6	18.2	6	18.2	1.000	0.034*
	Social Sciences	11	33.3	5	15.2	17	51.5	1.363	
	Overall	32	48.5	11	16.7	23	34.8	1.182	
8.Recycling should be encouraged for the protection of environmental resources as well as economical advantages.	Environmental Health	33	100	-	-	-	-	1.000	0.325
	Social Sciences	30	96.8	-	-	1	3.2	1.032	
	Overall	63	98.4	-	-	1	1.6	1.016	
9.Increase in CO_2 concentration in the air causes acid rains.	Environmental Health	6	18.2	27	81.8	-	-	1.182	0.386
	Social Sciences	24	72.7	-	-	9	27.3	1.273	
	Overall	51	77.3	-	-	15	22.7	1.227	
10.Almost 90 % of our energy comes from fossil fuels (coal, oil and gas).	Environmental Health	22	66.7	2	6.1	3	9.0	1.212	0.022*
	Social Sciences	20	62.5	8	25.0	4	12.5	0.875	
	Overall	42	64.6	10	15.2	13	20.0	1.046	
11.Plastics decompose in the nature by time.	Environmental Health	25	75.8	6	18.2	2	6.1	0.878	0.085
	Social Sciences	29	87.9	1	3.0	3	9.1	1.060	
	Overall	54	81.8	7	10.6	5	7.6	0.970	
12.Greenpeace is an non-governmental organisation acting only in U.S. for nature conservation issues.	Environmental Health	7	21.9	7	21.9	18	56.3	1.344	0.269
	Social Sciences	13	39.4	8	24.2	12	36.4	1.121	
	Overall	20	30.8	15	23.1	30	46.2	1.231	
13.Mediterrenean monk seals are on the brink of extinction.	Environmental Health	8	24.2	25	75.8	-	-	1.242	0.066
	Social Sciences	25	78.1	3	9.4	4	12.5	1.031	
	Overall	50	76.9	3	4.6	12	18.5	1.139	
14.In the last 40 years, the population of the world nearly doubled.	Environmental Health	29	87.9	-	-	4	12.1	1.121	0.262
	Social Sciences	29	90.6	1	3.1	2	6.3	1.031	
	Overall	58	89.2	1	1.5	6	9.2	1.077	
15.Only some animals are in danger of extinction. Plants are not.	Environmental Health	30	90.9	3	9.1	-	-	0.909	0.514
	Social Sciences	26	78.8	6	18.2	1	3.0	0.849	
	Overall	56	84.8	9	13.6	1	1.5	0.879	

Table 3 shows the frequency of response (as percentage) to each item in the knowledge section of the questionnaire. The students had the highest mean score in the recycling item. Almost all of the students (98.4%) are aware of the benefits of the recycling both economical and ecological aspects. The organization of several recycling campaigns especially for paper, tin cans and packaging materials in all levels of schools (primary, secondary schools and universities), pilot recycling projects implemented by municipalities might be the major reason for this increased awareness of students. Additionally media (newspapers, magazines, radio and TV) is another important factor affecting the recycling activities through several promotions implemented. In the overall, 89.2 % of the students know the fact that, "in the last 40 years, the population of the world nearly doubled." The accelerated increase in environmental problems might be the reason for the higher percentages of responses. There is no statistically important difference for this question for environmental health students (87.9 %) and social science education students (90.6 %).

Students' understanding of the items on environmental issues that have had a more global implication such as acid rain, deforestation, the greenhouse effect and ozone depletion is fairly higher. For example, 84.8 % of the students know that ozone depletion is a global problem and effected even in Turkey. Although 77.3 % of the students could correctly identify sulfur dioxide as the main cause of acid rain and deforestation were understood by 78.1 % of the students; they do not know well the sources of energy; only 64.6 % were reported the correct answer for the item "almost 90 % of our energy comes from fossil fuels (coal, oil and gas)". However this energy question is one of the 3 items showing statistically significant difference among two groups of students (mean= 0.878; $p<0.05$). The main cause of difference is the undecided students. Other items two groups of students differ from each other were; the 'greenhouse effect' and 'ozone depletion' are, as a matter of fact, the same phenomena (mean=0.515; $p<0.05$); the 'greenhouse effect' is a result of burning coal and oil (mean=0.803; $p<0.05$) and using high octane gasoline (super) in cars helps to reduce air pollution (mean=1.182; $p<0.05$). In the first one as opposed to expected, percentage of correct answer (60.6 %) for social science education students is higher. However, in other two items, the percentage of environmental health students reported correct answer is much higher (75.8% and 63.6% respectively). This might be explained by the technical perspective of the items. Since the social science education students are not given technical environmental courses; they may not know such items.

There was a strong awareness among students about the extinction of species; 76.9 % of them know Mediterrenean monk seals are on the brink of extinction and the level of knowledge is quite high about the extinction of plants with 84.8 %.
The item with the lowest mean score was item 12 which tested students' knowledge of environmental NGOs, specifically Greenpeace. Only 30.8 % of the students choose the correct answer. This might be explained as, students do not know the international NGOs and they may not follow the developments about environmental issues in the world.

Table 4. Summary of responses to each behavior item

Item: Paraphrase of question	Department	Always		Never		Sometimes		mean	p
		n	%	n	%	n	%		
1. I collect recyclable materials seperately in my home.	Environmental Health	3	9.1	15	45.5	15	45.5	0.636	0.860
	Social Sciences	5	15.2	16	48.5	12	36.4	0.667	
	Overall	8	12.1	31	47.0	27	40.9	0.651	
2.I try to lessen the amount of waste produced in my home.	Environmental Health	20	60.6	4	12.1	9	27.3	1.484	0.738
	Social Sciences	19	57.6	5	15.2	9	27.3	1.424	
	Overall	39	59.1	9	13.6	18	27.3	1.455	
3.I close the tap while brushing my teeth.	Environmental Health	24	72.7	2	6.1	7	21.2	1.667	0.140
	Social Sciences	28	84.8	-	0.0	5	15.2	1.849	
	Overall	52	78.8	2	3.0	12	18.2	1.758	
4. turn off unncessary lights.	Environmental Health	32	97.0	-	0.0	1	3.0	1.970	0.091
	Social Sciences	28	84.8	-	0.0	5	15.2	1.849	
	Overall	60	90.9	-	0.0	6	9.1	1.909	
5.I prerfer public transport facilities in my daily life.	Environmental Health	27	81.8	1	3.0	5	15.2	1.788	0.516
	Social Sciences	26	78.8	3	9.1	4	12.1	1.697	
	Overall	53	80.3	4	6.1	9	13.6	1.724	
6.I am the member of environmental NGOs.	Environmental Health	3	9.1	28	84.8	2	6.1	0.242	0.286
	Social Sciences	5	15.2	24	72.7	4	12.1	0.424	
	Overall	8	12.1	52	78.8	6	9.1	0.333	
7.I support environmental NGOs financially.	Environmental Health	4	12.1	23	69.7	6	18.2	0.424	0.402
	Social Sciences	5	15.2	19	57.6	9	27.3	0.575	
	Overall	9	13.6	42	63.6	15	22.7	0.500	
8.I take care of environmental policies of the parties into consideration while voting.	Environmental Health	24	77.4	4	12.9	3	9.7	1.645	0.173
	Social Sciences	18	54.5	5	15.2	10	30.3	1.394	
	Overall	42	65.6	9	14.1	13	20.3	1.516	
9.I prefer to consume organic foods although they are expensive.	Environmental Health	12	38.7	3	9.7	16	51.6	1.290	0.221
	Social Sciences	12	36.4	10	30.3	11	33.3	1.061	
	Overall	24	36.4	13	20.3	27	42.2	1.172	
10.I prefer to consume environment-friendly products although they are expensive.	Environmental Health	17	51.5	2	6.1	14	42.4	1.455	0.842
	Social Sciences	16	48.5	2	6.1	15	45.5	1.424	
	Overall	33	50.0	4	6.1	29	43.9	1.439	
11.I do not prefer packaged products during shopping.	Environmental Health	8	24.2	6	18.2	19	57.6	1.061	0.004
	Social Sciences	3	9.1	17	51.5	13	39.4	1.576	
	Overall	11	16.7	23	34.8	32	48.5	0.818	
12.I try to use the two sides of papaers.	Environmental Health	30	90.9	-	0.0	3	9.1	1.909	0.111
	Social Sciences	26	78.8	2	6.1	5	15.2	1.727	
	Overall	56	84.8	2	3.0	8	12.1	1.818	
13.I do not use parfumes, deodarants, etc. Contaiининg CFCs.	Environmental Health	17	51.5	4	12.1	12	36.4	1.394	0.004
	Social Sciences	8	24.2	13	39.4	12	36.4	0.849	
	Overall	25	37.9	17	25.8	24	36.4	1.121	
14.I try to participate the conferences, films and meetings on environmental issues.	Environmental Health	11	33.3	2	6.1	20	60.6	1.273	0.065
	Social Sciences	8	24.2	9	27.3	16	48.5	0.970	
	Overall	19	28.8	11	16.7	36	54.5	1.121	

The students' general environmental behavior was measured in terms of their responses to saving paper, electricity and water, using less of private transport, attending environmental conferences and exhibitions and consumer behavior. As explained above, the majority of respondents indicate that they had sometimes (mean 1.239) engaged in the environmentally protective behavior. However as expected environmentally significant behaviors of 'Environmental Health Program' students differs ($t=2.039$, $p< 0.05$) from the 'Social Science Education' students.

Table 4 shows the frequency of response (as percentage) to each item in the environmental behavior section of the questionnaire. 90.9 % agreed with the statement "I turn off unnecessary lights"; 80.3 % reported that; "they prefer public transport facilities in their daily lives"; and 78.8 % reported that, "they close the tap while brushing teeth". However, these high scores might be interpreted in terms of economical benefits rather than behaving environmentally. In other words, environmentally beneficial actions may also follow from non environmental concerns, such as a desire to save money, confirm a sense of personal competence, or preserve time for social relationship. To understand any specific environmentally concern behavior requires further empirical analysis which out of the scope of this study.

Slightly smaller percentages (12.1%) of respondents participate in recycling activities as given in Table 4. This might be explained by the effects of external and internal barriers. That is, recycling is not understood well by decision makers. Therefore there is a lack of obligatory rules to promote recycling and collection services of recyclables. However, the perception of barriers by respondents did not measured in the context of this study. It might be proposed for further studies of environmental behavior.

The lower percentages (12.1%) is obtained in the statement" I am member of Environmental NGO(s) and support them financially (13.6 %) ". This means people are not engaged in environmental activities voluntarily and they do not make any contributions to NGOs. This might be explained with the economical constraints as in the recycling case. While people have difficulty in tackling problem of hunger in Turkey; supporting the NGOs financially is a luxury for them.

The statistically significant difference among two groups exists for the items related with the consumer behavior (11. and 13. items) such as buying products with less packaging and checked if the aerosols they bought contained CFCs. Environmental health students behave in more environment friendly way compared to social science education students. This was an expected result, since they are more educated on environmental issues and have higher awareness. However, it should be mentioned that for each item less than 50 % of the students showed that they had always engaged in green consumerism. For example for the above items, only 16.7 % of the students prefer to buy the products with less packaging or only 37.9 % of the students had took into consideration if the aerosols containing CFCs or not.

When investigating the students' main source of environmental information, it was found that the most effective tool is media with a score of 32.7 %. However, one of the most striking result of the study is, Environmental Health Program students showed different tendency and for this group, the most effective tool for environmental education is "nature itself".

Students' Perception of Source of Environmental Information
When investigating the students' main source of environmental information, it was found that the students gained most of their environmental knowledge from out of school sources rather than from general education at school. The 32.7 % of the students indicated that, they gathered most of their environmental information from the media (printed and electronic). However, one of the most striking result of the study is, Environmental Health Program students indicated their main source of environmental information different from the AÜ-EBF students as "nature itself".

Conclusion
The students have environmental knowledge and sometimes behaving in an environmentally significant way. However, there is no statistically important difference among students ($t=0.652$, $p> 0.05$) in terms of environmental knowledge. However, environmental behaviors of 'Environmental Health Program' students differs ($t=2.039$, $p< 0.05$) from the 'Social Science Education' students. Students who had taken environmental lectures are found behaving more environmentally way (mean 1.300) than the others (mean 1.178).
The hypothesis that greater environmental knowledge is positively correlated with environment friendly behaviors was not supported by data from this study. This lack of agreement may have occurred since the environmental knowledge is not internalized by the students. Therefore particular attention should be placed on developing the students' understanding of concepts and generalizations.
The results of the survey indicated that the students sometimes practiced positive environmental behavior. Therefore much can also be done in schools to promote that individuals might be environmentally responsible just by playing their role in their lives.

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A STUDY ON THE UTILIZATION OF THE TECHNOLOGICAL MATERRIALS USED IN SCIENCE CLASSES BY TEACHERS IN ELEMENTARY SCHOOLS

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With the developments in science and technology, today, teaching materials play an important role in teaching and learning environment. By means of the use of such materals in teaching, the knowledge gained in classes becomes more effective and long-lasting, and also durable.

This study aimed to determine the level of the use of technological materials in science classes by the science teachers working at elementary schools in Edirne city center, and of the utilization of such materials. The data gathered from 15 science teachers teaching in elemantary schools. The findings showed that in spite of the lack of material sources in schools, teachers stil use tehnological materials in their science classes.
Key words : *Science teacher, technological materials, primary school, sicience*

INTRODUCTION

Nowadays that science and technology develop rapidly; one of objectives of people is to want to develop their countries scientifically and technologically and to help this development. To accord society to developments in science and technology is possible to be provided good education and existence of individuals have good education. Developments in science and technology affect education as they affect all fields and supplement to raise instruction intended tools and instruments. Nowadays, instruction intended technological tools and instruments like computer, television, video, vcd player, overhead projector, science cabinet are used in learning and teaching media. These tools and instruments help learning as raising instruction process**(1)**.

In today education system, main purposes that be wanted to reach in education are to bring in skills to reach information and to conceivable learning, to provide to raise in science instead of transferring basic information**(2)**. Today, it is demanding that students to be raised individuals that find solution methods to problems, to use information, to know methods reaching information instead to reach to information from one source and to memorize these information. Getting these skills is only possible just giving well-qualified education. Well-qualified education is possible making learning-instructing media that endowed with instruction intended technological tools and instruments.

Nowadays that science and technology develop rapidly; main purpose of educational system should be gaining skills to students like reaching information, conceivable learning, finding solution methods to encountered problems, instead transferring current information. Science lesson is main lesson that gaining these skills to students**(3)**.

Because, science education should be made by concerning students' interests and needs, degree of developments, environment opportunities with appropriate methods and instruction intended tools and instruments, at the head of lessons that students is compelled and be unsuccessful is science lesson**(4)**. In science education, making students successful and providing effective, permanent, and meaningful learning is provided with using student active and technological tools used teaching methods.

In science education, when teaching concepts that be demanding to teach students, teaching methods towards as making and living teaching with instruction intended tools and instruments should be used. Because, information explained with using as making and living teaching methods are permanent, this type of learning improves creativity, generalization and problem solving skills**(5)**. Be successful in science lesson, effective and permanent science education, providing expressive learning are provided with teaching methods that aim at student based and student active making and living teaching. To providing effective and permanent learning is made by using learning media with visual and auditory tools that addressed to eye and ear and permitting students making research.

Learning should be made simpler by providing to usage of technological tools and instruments that assistant to active learning at learning-teaching media**(6)**. The way that get better in education, can be provided by forming teaching-learning media endowed by instruction intended tools and instruments. For this reason, because using instruction intended tools and instruments in education make simpler learning, learning-teaching media should be endowed by these tools and instruments. Because, usage of learning-teaching media be endowed by tools and instruments depends on teacher, teacher should have enough information. Consequently, teachers should educate themselves about usage and selection of these tools to make permanent and effective learning. Tools and instrument used by learning teaching activity should be used with proper method and proper time application on proper time. Tools, which are not used on proper time and proper place, cause to dilute time even they are very expensive. Tools should be appropriate with students' level and explained subject.

Tools usage in science teaching kindles the interest of students, makes simpler to learning, and brings dynamism to class. It excites wish for research by providing students to participate to class. Usage of instruction intended tools and instruments in science teaching have an active part to reach the training program to success by providing students to attain prescribed targets easily. When science subjects are explained with tools, more permanent and efficient learning is obtained compared to classical method**(7)**. Instruction intended tools and instruments have a great importance to make the information explained in learning-teaching process be permanent and effective. It is known that subjects explained with tools can be more understandable and permanent. Although, schools have enough tools and instruments, it is known that they are not used at expected level. Lessons are generally taught with classical methods by teachers. Therefore, it directs students to memorization and cause students' negative attitude against lessons.

This study is done to determine the current situation of instruction intended tools and instruments in primary schools at Edirne city center and usage frequencies of these tools by science teachers.

MATERIAL AND METHOD

In this study, the current situation of instruction intended tools and instruments in schools, usage frequencies of these tools and instruments by teachers during science classes, if they show difference with schools situations and class level are attempted to determine. It is asked questions to 15 science teachers about which tools and instruments they use and usage levels of them at science classes in Edirne city center. The current condition of instruction intended tools and instruments, usage situation of them during lessons are compared according to schools and teachers' service period. Results are obtained from questionnaire applied to teachers and interviews facing one another.

Study is applied at spring term in 2004-2005 academic year. Questionnaire is applied by students which went schools for school experience and teaching application courses. All teachers participated to study are considered to give answers to questions objectively.

EVIDENCES AND INTERPRETATION

The teachers say although the equipments that are utilized in science teaching as TV (80%), Video-Vcd (70%), projector (65%), science sideboard (75%), and microscope (60%) take place almost in every school and they seem as a need for science courses and they are used frequently, they are not enough unfortunately in the most of the schools.

The equipments that are used during instruction should be suitable for the students' level and curriculum. Due to this, it is determined that TV, Video-Vcd, projector, science sideboard, and microscope are appropriate for both science curriculum and instruction.

This research was done in order to find out what equipments are appropriate in primary school science courses and how often they should be utilized by the teachers and in respect of the results of the research, it is verified that TV, Video-Vcd, projector, science sideboard, microscope and computer exist almost in all of the schools. In spite of existing in every school, the teachers conclude the numbers of equipments are not as much as necessary to meet a need of the schools. The teachers say that they use these equipments from time to time with respect to the properties of the teaching science topics.

In the light of this research, as some of the teachers who work in the schools covering adequate numbers of equipments use these equipments, the other teachers determined that they wish to use science equipments in their courses, however, they make use of them a little due to not being enough equipments in their primary schools.

In science courses if the equipments are used in appropriate situations, together with causing the students to earn positive attitude against the course, effective and permanent learning come true.

CONCLUSION

This research is obtained from the opinions of the science teachers taking place in the primary schools. The assessment of the responses of the asked questions points out that almost all of the teachers make use of the course equipments during talking about the science concepts and they will draw benefit from them in their future science courses.

The availability of course equipments is not the same in every school. Even though these materials in some schools are not enough in some schools, it can be observed that in the other schools they are more than they are needed. This situation indicates that there are the differences in the proportions of the teaching equipments' existence with respect to physical conditions of the schools. It seems obviously that the schools having science laboratory acquire more equipments than the schools not having science laboratory.

The teachers in the schools having adequate number of the science course equipments can take advantage of television, projector and video-vcd. In spite of existing course equipments the teachers express not using them due to some reasons.

In respect of the conditions of the primary schools the science teachers in the schools holding the good physical conditions utilize the science equipments more frequently.

According to the results of the research in spite of being in the city, it is observed that in all of the primary schools the equipments are not the same quantity. Furthermore, it is seen that in the schools which are good condition on account of science course equipments the teacher utilize them more than in the other schools.

With respect to the results of done research, in the point of the existence of each science course material in the primary schools the frequency of using them is examined in a low proportion. There may be the different reasons of this condition as the inadequate number of the equipments, teachers not using them or not knowing how they use these equipments during the lessons.

Although the teachers of the primary schools that the research was done use the course equipments in science courses enough, the teachers in the schools in which the equipments are not enough desire to use these equipments, however, they determine not having chance to make use of them more.

In science teaching if the equipments are used in an accurate and appropriate manner, in addition the students acquire the positive behavior against the course, during the fulfillment of the effective and consistent learning, they become efficent.

In this research done about the teachers' using equipments in the science courses of the primary schools, in spite of the existence of the science course equipments in enough number and enough quality in the schools, it is arrived at a conclusion that they are not utilized in the high level during teaching action.

Television, video, VCD, projector, microscope, science sideboard take place almost in every school and even though there are the required the science course equipments used by the teachers, it is seen that the degree of the using them is not a desired level.

According to the teachers, in science education the using of the science equipments and materials on time and on site become useful during the training. In the environment of teaching and learning, the equipments being beneficial for the students is provided by the teachers using them effectively. Due to this, during the training, the using of the science equipments and materials on time and on site productively depends on the teachers' attitudes.

In the light of the results of the research, with respect to the assessment of the teachers' points of views about using the equipments in the science courses as;

- Increasing the frequency of using the science equipments during science education causes increasing the students' interest and dislike against science courses.
- The science topics taught by using the equipments are learnt by the students better.
- Teachers wish to teach science subjects with using science equipments.
- Using the equipments in science course affects the students' learning in a positive way.
- Using the equipments in science courses provide the effective and temporary learning of the students.
- Using the equipments in science education directs the students to research.

The results of the research bring up a matter as that using of science equipments is required in science education.

Using science equipments in science education provides increasing the students' interest and success about science courses in a positive way. Because of this, during the activities in education, using the equipments frequently and arraying the learning environments with these equipments are recommended.

This research is based on how often the teachers in the primary schools utilize science equipments during science courses, the appropriateness of these equipments for the grades of students and whether there are the differences in them in respect of the condition of the schools or not and it determines the results below:

- All of the teachers in the primary schools point out the importance of using science equipments during the lessons in order to obtain effective and permanent learning.
- Although the opinion of the science teachers in the primary schools are optimistic against using technological equipments, it is appeared that these equipments are not used frequently in the science education environment.
- The teachers do not use science equipments which are existing and reached easily in spite of being aware of these equipments useful for students' comprehension.

This research aims to utilize from the idea about using the technological equipments of the teachers who are attendant in the primary schools during teaching-learning process and it forms propositions depending on their ideas. The propositions are below:

- In schools by means of using visual-auditory scientific equipments the methods of teaching science topics should be differentiated and as settling technological equipments TV, video and VCD in the classrooms , the environment should be formed for effective use of these equipments. Old or dated equipments should be modernized in order to meet today's needs.
- In-service education about how teaching equipments being used are offered to the teachers.

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THE RELATIONSHIP BETWEEN THE PLACES WHERE PEOPLE LIVE AND THEIR QUALITY OF LIFE IN TRNC

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This research has been done on students and their parents in three different schools in three different areas in Nicosia to determine the relationship between the environment where people live and the quality of their living and the effect of their life styles on their children.

This study proves that there is not any relationship between environment where people live and ability to cope with stress. It is also found out that compared to the people who live in apartments the people who live in houses with gardens have better quality of living; they smoke or drink less and they have better eating and exercising habits.

Introductıon

Quality of Life, in simple terms, means: '' How good is your life for you?'' The answer to this question is a measure of a person's quality of life. Every persons life is different, and thus the way in which each person experiences a quality is unique. Individuals lead complex lives that have many dimensions (Table :1).

Table 1: The nine areas of life in three domains
(www.utoronto.ca/qol/profile/adultVersion.html)

Being	**Physical**	My body and health
	Psychological	My thoughts and feelings
	Spiritual	My beliefs and values
Belonging	**Physical**	Where I live and spend my time
	Social	The people around me
	Community	My access to community resources
Becoming	**Practical**	The daily things I do
	Leisure	The things I do for fun and enjoyment
	Growth	The things I do to cope and change

Physical belonging; pertains how you fit in with the physical aspects of your environment. Important aspects of physical belonging ınclude the place where you live, your material possession, your privacy, your feelings of safety, and the neighbourhood and country where you live.

In the early 80s the concept of 'quality of life' was included in the literature assessing health. However, this concept was first used in the constitution of World Health Organization (WHO) . WHO defines health as not only being away from illnesses. According to WHO this concept means the state of being physically, psychologically and socially well . In this rescpect, this survey aims at assesing the relationship between the places where people live and their quality of life (Zorba,2001).

Aim

This research has been done on students and their parents in three different schools in three different areas in Nicosia to determine the relationship between the environment where people live and the quality of their living and the effect of their life styles on their children.

Method

In this research in which 633 parents from Near East (375), Ertuğrul (166) and Arabahmet (92) primary schools in Nicosia paticipated the relationship between the environment where children are raised and their educational success, the parents' education, the social activities they take part in and their life styles (smoking, drinking, exercising, the way they deal with stress) are evaluated. The life style inquiry of American Health Organization is taken as an example for this inquiry- statistical analysis, SPSS software 10.00 version programme and statistical techniques of related and independant variables are used.

Findings

It is discovered that on average the parents are 37,98 ±4.8 years old. (Males are 39,97± 5,1, females are 36,36± 4,6) The percentage of the university graduates is % 34.8 (female university gradutes %29,9 , males %39.7) (Table 2).

Tablo 2: Parents Education

	Male		Female	
	Frequency	%	Frequency	%
primary school	72	14.9	85	16.9
middle school	55	11.4	38	7.6
high school	165	34.1	229	45.6
University	192	39.7	150	29.9

According to the research the percentage of parents who avoid being in smoking areas and don't smoke, are %37,1 (235).

As for the question about drinking habits, % 43,8 (277 people) have responded that they do not drink alcohol.

The parents who participated in this research are asked questions about their training habits. %5,2 (33 people) of the participants have reported that they do exercise and pay attention to their body weight.

The participants are also asked questions about eating habits. As for salty food, %21.5 (136 people) of participants have reported that they avoid salt and sugar, and they eat variety of food everyday.

As far as finding ways to overcome stress is concerned, %10,1 (64 people) of participant have found ways to overcome stress.

According to this research there is a correlation between the educational status of people and their tendency to live in houses with gardens ($p<0,01$). Besides, there is also a correlation between being Turkısh Cypriots and the tendency to live in houses with gardens ($p<0,01$).

It is also found out that compared to the people who live in apartments the people who live in houses with gardens have better quality of living; they smoke or drink less and they have better eating and exercising habits.

When the way people cope with stress is considered, the people who live in houses with gardens can find the ways to overcome stress more easily than the ones who live in apartments.

It is also discovered that there is correlation between the people who live in houses with gardens and their tendency to take part in social activities ($p<0,01$). It is seen that compared to the others students from Ertuğrul and Arabahmet the students from Near East Primaryschool mostly live in houses with gardens. There is a correlation between the parents of the students of N E primary school and their tendency to participate in social activities ($p<0,01$). There is also a correlation between how the parents of the students of N E can cope with stress better than the other parents of the students from the other two schools ($p<0,01$).

When the life styles of male and female parents are taken into consideration, a meaningful relationship is not discovered between the environment where people live and their ability to cope with stress.

It is also found out that the people who live in apartments usually do not smoke ($p<0,01$).

According to the research there is a negative relationship between educatıon level of parents and the number of children they have ($p<0,01$). As a result, the parents who have more children live in apartments

Table3:

Correlations

	Anne uyruk	Anne egtim	Baba egtim	Ev aptm	Sosyal faaliyet	sigara	alkol	beslenme	egzersiz	stres
kardeþsayýsi	-.465(**)	-.454(**)	-.413(**)	-.107(*)	-.153(**)					-.164(**)
anneuyruk	1	.488(**)	.366(**)	.162(**)	.187(**)	.172(**)		.116(**)		.224(**)
anneegtim		1	.725(**)	.177(**)	.141(**)	.169(**)			-.138(**)	.153(**)
babaegtim			1	.207(**)	.203(**)	.094(*)			-.116(*)	.177(**)
yerlesimkentkoy				-.315(**)						
evaptm				1	.308(**)	.385(**)	.483(**)	.400(**)	.244(**)	.396(**)
sosyalfaaliyet					1	.296(**)	.383(**)	.552(**)	.568(**)	.807(**)
sigara						1	.632(**)	.459(**)	.322(**)	.392(**)
alkol							1	.586(**)	.435(**)	.516(**)
beslenme								1	.587(**)	.690(**)
egzersiz									1	.644(**)
stres										1

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Conclusion

An individual is part of socio – cultural environment and this environment influences the individual's behaviour. Being a member of a group, having a job, building the fortune and having difficulties in adapting to a new environment make people have various problems. There are some facts which determine the ways of overcoming stress, smoking, drinking, eating and training habits of an individual. Some of these factors are the socio-economic status of the families, the habits of parents the unique characteristics of the individiual and the environment .

According to another study (WHOQOL-BREF TR) : the environment has a great effect on health (Didem Arslantaş, 2006).

According to another study aims to clarify the quality of life (QOL), mental health, and nutritional status of adolescents in Dhaka city, Bangladesh by comparing non-slum areas and slums, and to find the factors associated with their mental health problems (A sample of 187 boys and 137 girls). All significant differences in demographic characteristics, anthropometric measures, and WHOQOL-BREF were found to reflect worse conditions in slum than in non-slum areas. Contrarily, all differences in SRQ and YSR were worse in non-slum areas for both genders, except that the "conduct problems" score for YSR was worse for slum boys. Mental states were mainly associated with school enrolment and working status. Worse physical environment and QOL were found in slums, along with gender and area specific mental health difficulties. The results suggest gender specific needs and a requirement for area sensitive countermeasures (Rebecca Renwick 2006)

In this study, it is also found out that there is not any relationship between environment where people live and ability to cope with stress. It is also discovered that compared to the people who live in apartments the people who live in houses with gardens have better quality of living; they smoke or drink less and they have better eating and exercising habits.

There is growing evidence to support the view that being physically active can maintain and improve physical and mental health and it improves quality of life and well being (Skevington,s 2006)

Physical activity has positive effects on several health parameters. Despite this knowledge , only 10-15% of the adults in the western civilised countries are regularly physically active (Sallis &Owen, 1999).

In this research, %5,2 (33 people) of the participant have reported that they do exercise and pay attention to their body weight.

The abilitiy to respond for stress plays an important role in the quality of life and effects the lifespan as well (Radak.Z.2006)

According to another study the leading health problems related to stress were headache (% 24), sleep disorders (% 19.2), excessive nervousness(% 15.4) (Vedat, ışıkhan 2006)

In this study, As far as finding ways to overcome stress was concerned, %10,1 (64 people) of participants have found ways to overcome stress.

Another study descovered that people with lower educational level do not have good life styles. (Didem Arslantaş)

In this study there is not any relationship between age and good life style. According to the research there is a negative relationship between educatıon level of parents and the number of children they have ($p<0,01$). As a result, the parents who children they live in apartments.

It's not enough to evaluate cigarette smoking by taking the smoker only. It is seen in the smokers families that children die at an early age and most of them suffer from infections of middle ear and respiratory channels and asthma Compared to the others adults living in such families suffer more from cardiovascular diseases and lung cancer. In our research it is seen that The percentage of parents who avoid being in smoking areas and don't smoke, is %37,1 (235).

According to another study : % 63,2 of the people who go to a cafe frequently in Is parta and who are 21,35 + 2,13 years old on average smoke- In Turkey the percentage of the male smokers over 15 is % 60 and of the female smokers is %25 – on average % 43,6 of all Turkish people smoke. (Kişioğlu, 2004)

In the research that is done with the staff (headmaster, assistant head master, teacher : 849 people) of the primary schools in the towns of Ankara it is discovered that % 41,7 of them smoke (Karakoç 2004).
In another research that is done with the 96 staff of AİBÜ Düzce Faculty of Medicine, it is discovered that % 20,3 of them smoke (Öcal 2004).
In a research in a high school in Ankara 531 students are hand out questionnaires ed and it is seen that % 10,6 of them smoke.

For an active and healthy life we must have some good habits and these habits are usually gained in childhood. It is a good idea to help our children gain these good habits so that we will have a healthy community in the future . It's especially the parents' responsibility to teach their children how to acquire these good habits. However, to do this, the parents themselves must be fit and healthy (Atamtürk, 2005).

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THE EVALUATION OF ENVIRONMENTAL PERCEPTIONS OF THE STUDENTS AND TEACHERS OF A SECONDARY SHOOL IN ANKARA

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Children are influenced by physical, biological, and social factors in the enviroment and may not able to be aware of the environmental factors which may affect their healths. The environmental issues should be taken into consideration when implementing intervention plans (1, 2). Researches on school health drew attention to environmental factors recently (3, 4).

Physical, social and psychological health should be provided and maintained for the school age children. Health promotion is an important subject among the school health services. The environmental health constitutes substantial proportion of the school health services (1).

Because of the environmental factors, many health problems can be seen in this age group (1, 2, 3, 5). Children go out of the house and try to learn and discover their environments. The school environment as a new environment and a new exposure field are discussed in this study (6). Students and teachers spend most of their time at school or the school environment where they are affected by different kinds of environmental factors (1, 3). Therefore school environment should be concerned as a special place. Evaluating the environmental perceptions of the students and the teachers, will be helpful to promote and qualify this place (1, 3, 4, 5). The aim of this study is to determine the environmental perceptions of the students and teachers of a secondary school and of the experts who has worked at this school in a health project for one year.

Material and Method

Three hundred twenty five (92.8%) secondary school age children (12-14 years), 23 teachers (60.5%) and 7 experts from a faculty of medicine in Ankara and who has worked at this school in a health project for one year were included in this cross-sectional study. Data collection was completed by self-administered questionnaires at 9 March 2006. SPSS 13.0 was used for basic analysis and ki-kare and t-test were used for analysis.

Answers given by the students, teachers and experts were scored from 1 to 5 and the total score was found for 11 topics (tidy, interesting, colourful, spacious, wide, clean, well decorated, comfortable, friendly, fresh, warm). One and two points were accepted as "negative", four and five points were accepted the "positive". The minimum score was 11, maximum score was 55. Age, sex, classroom, socio-economic status, environmental perceptions of students, teachers, experts and 11 topics on school environment characteristics were the variables in this study.

Results

Of the students, 53.4% were female, 46.4% were male and the mean age was 13.03±0.94 years (min=11, max=16, median= 13). Of the students, 35.5% (109 students) stated that socio-economic status of their families were good.

Of the teachers 50.0% were males. Mean age of the teachers was 38.9±1.6 years (min=28, max=56, median= 37). Six of the seven experts were females and the mean age was 47.0±2.9 years (min=35, max=61, median= 46).

Of the students, 67.1% and of the teachers, 52.1% stated that "the school was wide". Of the students 63.1%, of the teachers 50.0% and of the experts 71.5% stated that "the school was noisy". Of the students, 48.5% and of the teachers 56.5% stated that "the school was discomfortable" (TableI).

Table I: Positive evaluation of school and school environment characteristics by students, teachers and experts

	Students		**Teachers**		**Experts**	
	n	**%**	**n**	**%**	**n**	**%**
Tidy	151	48.4	9	39.1	1	14.3
Wide	198	67.1	12	52.1	1	14.3
Clean	144	47.2	11	47.8	-	-
Friendly	133	44.0	12	52.1	4	57.1
Noisy	191	63.1	11	50.0	5	71.5
Smelly	137	45.0	7	31.8	5	71.5
Colourless	105	34.6	9	42.8	2	28.6
Discomfort	146	48.5	13	56.5	3	42.9
Decoration	99	32.9	4	18.2	-	-

The first three positive environmental perceptions stated by the students were "the school was wide (67.1%), warm (56.0%) and tidy (48.4%)" and the first three negative environmental perceptions were "the school was noisy (63.1%), discomfortable (48.5%) and badly decorated (40.6%) ".

The first three positive environmental perceptions stated by the teachers were "the school was warm (60.9%), friendly (52.1%) and clean (47.8%)" and the first three negative environmental perceptions were "the school was discomfortable (56.5%), noisy (50.0%) and colourless (42.8%)".

None of the characteristics of the school and the school environment were evaluated positively by expert. The first three negative environmental perceptions the experts stated were "the school is noisy (71.5%), badly decorated (71.5%)) and smelly (71.5%)".

There was no significant association between the mean score and the students' age, sex, socio-economic status and classroom characteristics (p=0.212, p=0.112, p=0.436, p=0.125).

Mean scores of the the students, teachers and the experts were 31.19±0.63 (min=0, max=55), 30.96±2.16 (min=12, max=51), 27.57±7.69 (min=13, max=35) respectively.

There was no significant association between the mean scores of the students and teachers (t=0.095, p=0.924).

There was no significant association between the mean scores of the students and sex (t=0.915, p=0.361).

Discussion:

In this study it is found that students', teachers' and the experts' perceptions on school and school environment vary. But there was no significant association between the mean scores of the students and teachers, but the percentages differed.

There was no significant association between the environmental perceptions of the students and teachers. But the percent of students who stated that "the school was noisy" were higher than the teachers.

In this study, of the students, 48.5%, of the teachers, 56.5% stated that "the school was discomfortable". Comfort is important to improve school health and to prevent diseases (2).

The positive environmental perceptions of the students and teachers about school and school environment were different. But the negative perceptions of the students, teachers and expert about school and school environment were likely.

Reserches on school health are mostly conducted on physical environment of the school and the behavioural patterns of the students. Children spend the day in schools. Therefore students' and teachers' environmental perceptions on school environment should be considered important while determining the needs of students and teachers. Interventions in school and school environment should be based on these needs.

Before planning interventions on school and school environment, environmental perceptions of teachers and students should be considered. Studies on environmental perception are limited in number and should be supported by quantitative researches. The new and large studies must be conducted about the school environment perception.

The data about the environmental effects on child health is not enough. The environmental perceptions and awareness of the students and teachers should be increased to promote school health and environmental health (7).

Educational programs in school should be planned and sustainably implemented with the full participation of children, parents, teachers, school staff and the community and should include activities to increase awareness of social, environmental and economical factors those affect child health (8).

Studies on children's and teachers' environmental perceptions are limited in number. New researches are needed and these researches should be validated by qualitative studies.

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"EDUCATION FOR SUSTAINABLE DEVELOPMENT: TRANSFORMING LEARNING INTO REAL LIFE ACTIONS: EXPERIMENTING ACTION-BASED LEARNING MODEL (ALM) AT ELEMENTARY SCHOOL LEVEL IN THE CONTEXT OF PAKISTAN".

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In my context, I have genearlly observed that most of the people including women and children are very much careless to their physical environment, resources and society. From home to school and later in matured life, people have not leant how to keep house and street clean, how to save resources and how to use them effectively and optimally, and how learn togather, share and live together. The main reason for lacking of these attitudes is the non-availability of education that should develop these behavoiurs. Our curriculum at elementary school level does not focus areas like environmental education, daily life economics, and social equity. At the same time, teacher is neither skillful nor self groomed to integrate and enrich the curriculum – include these important areas. Due to non-availability of this education at any elementary school level, people generally develop the behavoiurs in their life that are . For eaxmple, throwing waste inside and outside of their home and never realizing of its bad consequences, misusing resources, and think and live for self and not for community are common attitudes in my context.

My experiences as a teacher, teacher educator and a member of this society suggest that it is very hard to change attitudes of adults through any way in my context. The main reason is their inflexible nature that does not accept change so easily.

We should not have to be so hopeless and think for a solution that should be sustainable and have positive impact for future generations. In my opinion, there is a solution and that is educating our new generation at elementary school level and motivating them to that extent they would develop sense of ownership, sense of responsibility, play role in motivating their parents and friends to change themselves, continue to practice things and make them as a part of their routine life.

Most of the researches on children suggests that all children have natural tendency to explore themselves and their surroundings, constructing knowledge and things, transforming learning into actions, making things as the part of their habit, reflect on what they do and how they do, etc.; therefore, it looks quite justified to pay focus on children. Today's children are tomorrows' matured citizens. If these children learn and develop positive attitudes towards the environment, resources and the society at this stage of life; hopefully, they will be able to make it as a part of their nature and continue to practice for the entire life.

If we are serious to develop a better sustainble development norms and values in the future then we have to start this work from educating our children at elementary school level. In this regard, we shall have to reshape our curriculums; change them in a way that children would learn how to save this earth, how to save resources and consume in way that we could transfer them for next generations, and build active socail relationships in the world.

Literature review

Above analysis presents emphasis on educating elemnatry school children with the main focus on: environment, economics and society as the part of their curriculum so that they could be able to think and act for the evironment, resources and the society. Quite recently a term 'Education for Sustainable Development" has been evolved which talks about education that help in balancing environment, economy and society. As Statement by the Ministers of the Environment from the UNECE Region on Education for Sustainable Development (2002) testifies the importance of education for sustainable development. It says, *'Education apart from being a human right is a prerequisite for achieving sustainable development and an essential tool for good governance'.* Further literature says, 'Education for Sustainable Development is an emerging but dynamic concept that encompasses a new vision of education that seeks to empower people of all ages to assume responsibility for creating a sustainable future' (UNESCO 2002 'From Rio to J Burg p.1).

Education for Sustainable Development carries with it the inherent idea of implementing programs that are locally relevant and culturally appropriate. This is the prerequisite that all sustainable development programs including ESD must take into consideration the local environmental, economic, and societal conditions.

To create an ESD curriculum, educational communities will need to identify knowledge, issues, perspectives, skills, and values central to sustainable development in each of the three components - environment, economy, and society.

Keeping all these in mind, I have developed a model called "Action-based Learning Model" (ALM), see Fig. 1. I want to implement this model on a very small population of children at primary school in my context with this expectation that if this model goes successful can be applied on the entire population of elementary schools in Pakistan because of having similar features.

Research Questions

In my research, I have set some questions that I would like to answer, which are:

1. What are the possibilities for integrating ESD in curriculum at primary school level in my context?
2. What are the possibilities for motivating school community for change?
3. How far learners successfully transform learning into real life actions?
4. How far they are able to bring continuity in actions?
5. How the strategy of reflection helps in evaluating thoughts, actions and changes?
6. How far this model is valid, reliable and generalizable in my context?

Research methodology

This will be a qualitative action research. The rationale behind my selection of qualitative research is to discover in-depth realities. Qualitative research has this ability by virtue of its nature for which Hoepfl, (1997) says, "qualitative research reports, typically rich with detail and insights into participants' experiences of the world". Research that I have planned is detailed, descriptive, analytical, critically reflective and having a clear sense. In qualitative paradigm, I have selected action research in qualitative paradigm. Purpose of choosing action research is problem solving. It sees three things: researcher's action, actions of research participants, and the situation. Carr and Kemmis (1986) have nicely put all this in framework of a definition. They say:

Action research is a form of self-reflective enquiry undertaken by participants in social (including educational) situation in order to improve the rationality and justice of a) their own social and educational practice, b) their understanding of these practices, and c) the situation in which the practices are carried out (p.43).

I will use model of action research developed by Kurt Lewin. The cycle of activities will include: identifying a general idea, reconnaissance, general planning, developing the first action step, evaluation, revising the general plan. I will continue to repeat some cycles in order to see assess the process and outcomes of change of change both in research participants and the situation.

a. Research context

I will do my research in two elementary schools situated in both rural and urban setting. The rationale behind selecting these two types of schools will be to see the possibilities of application of this model in two types of settings in my context. The entire population of children of school will be the sample of my research.

b. Methods of data collection

The methods of data collection include: observation, semi-structured interview, document analysis and teachers' and my personal reflections will be the sources of my data.

1. ***Observation***

I will observe the activities of the children like interacting with teacher and the peers; use of learning resources; and working as individual. During observation, I will collect the data through field notes.

2. ***Semi-structured interview***

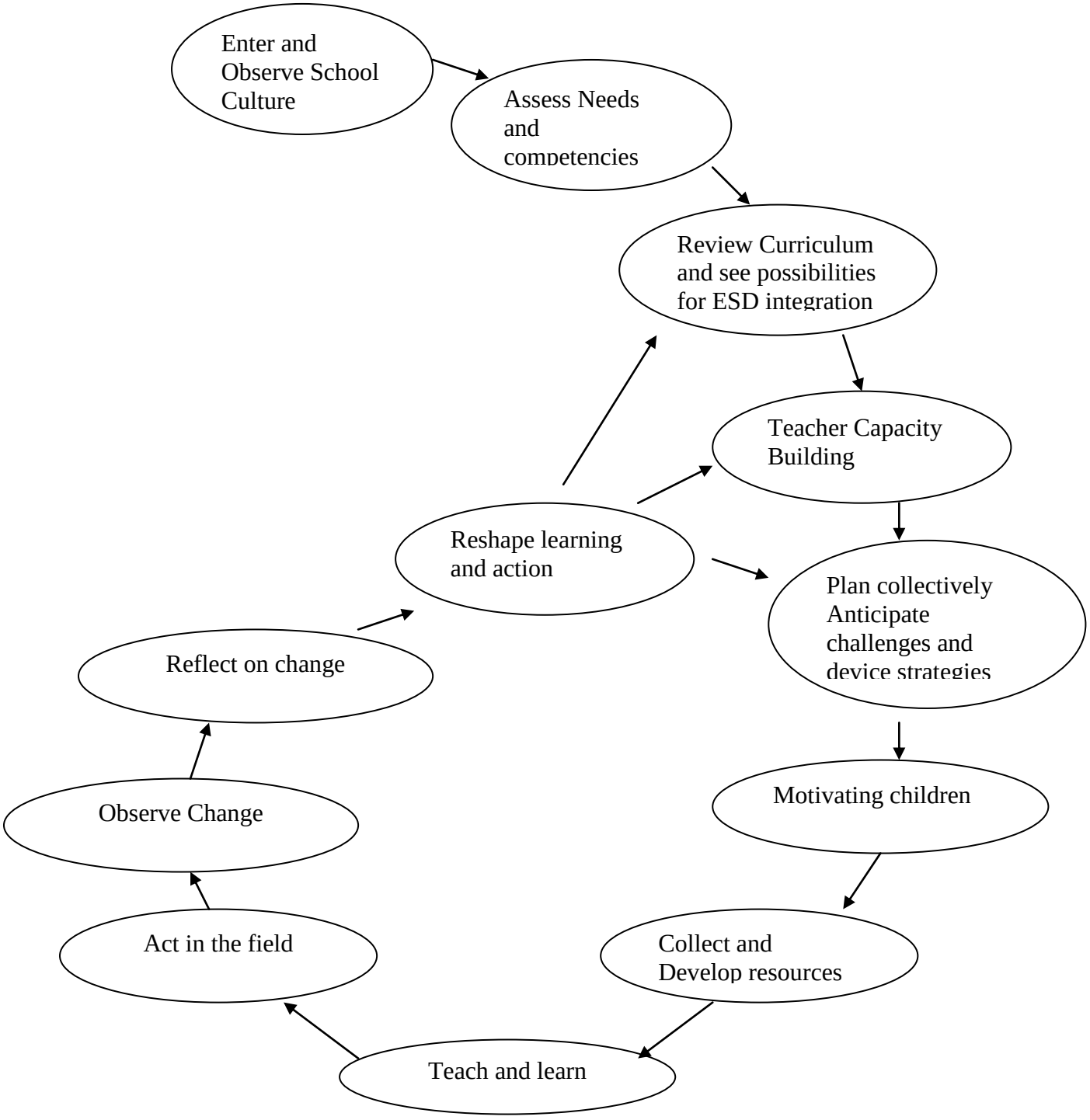
On some stages of my data collection process, I will conduct semi-structured interviews with the children under research. I will record interview, which later on I will transcribe. Rationale behind selection of this method is to record the research participants' views about their learning processes. The words used by Elliot (1991) with regard to the importance of semi-structured authenticate the use of this type of tool in data collection process. He says, " A semi-structured interview, where the interviewer asks certain preset questions but allows interviewees freedom to digress and raise their own topics as the interview progresses, is probably better than a rigidly structured approach".

3. Document analysis

I will also refer children's record like worksheets, drawings, reflections, etc. In my opinion, this type data presents opportunity to researcher to see creative work of children. In words this could be said that whatever the schema that children develop (that is abstract), they try to give it a concrete shape.

Figure 1

Action-based **Learning Model (ALM)**



4. Reflective diary

I will regularly write reflective memos regarding all my actions, observations, feelings, reactions, interpretations, etc. These reflections will respond questions will appear on spot or later on when doing formative analysis. I will continue to maintain this diary till the dissertation write-up.

c. Methods of data analysis

There will be two types of analysis: formative analysis and summative analysis. In formative analysis, data will be analyzed on regular basis. The advantage of this type of analysis will be guiding in nature: to look in to the data in order to assess where research is and what further can be done. This approach will help to bring improvements or changes that deem necessary. The second analysis will be summative. This will be carried out after finishing data collection process. In this process, codes will be developed which later on will be converted into the categories. Later, the meaning and conclusion would be drawn.

Why researching this particular topic

Once, ten yaers ago I heard a term ‘sustainable developemnt’ in a workshop organized by a loacl NGO. This term put me into thinking about its imporatnce in human life. I put all efforts in understanding the meaning and impliactions of this term. Later, whenever I was involved in community development work or school improvement programs, I alawys tried to make advocay about this term and tried to motiavte for action. Quite recently, I attended two presentations organized by IUCN Pakistan, I learnt about education for sustainable development. Knowing about this created in me a thurst to know it further. When I explored literature, I found its significance particularly with reference to formal education at elementary education in my context as the starting point for education that may lead to sustainable development.

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CHILDREN'S CURIOSITY ON ENVIRONMENTAL ISSUES AND PROBLEMS: A CASE FROM TURKEY

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The aim of the study is to investigate 5th grade students' curiosity on environmental issues and problems. 99 fifth grade students in three private primary schools, in which eco-school project was carried out, participated in the present study. As a data collection instrument, Environmental Curiosity Questionnaire (ENCUQ) including two parts was used. In the first part, in addition to background questions (name, gender…etc), the students were asked to what extent they were curious about environmental issues and problems (e.g. ozone layer depletion, endangered and endemic species, water, air and noise pollution, damps, underground resources… etc). There were twenty nine items on a four point Likert type scale [4-*I am highly curious about this issue*, 1-*I am never curious at all*] in the firth part. The second part was basically designed to get students' open-ended responses. In this part, the students were asked to assume themselves as a teacher teaching for the environmental and required to indicate in which environment they would like to teach environmental related concepts and what kind of activities and methods/techniques, instructional media and resources they would like to use so as to teach these concepts. They were also given a paper to draw a picture reflecting the classroom environment where they would teach environmental issues and problems. The results indicated that the students were highly curious about ozone layer depletion, layers of the earth, global warming, endemic species of Turkey (*e.g.* Yanardoner plants), recycling of the water damps, greenhouse effects, alternative and clean energy (water and wind), underground sources of Turkey and environmental non-governmental organizations and societies (TEMA, KIR-CEV…etc) respectively. They believed that when the environmental issues and problems were studied in the natural environment (*e.g.* forest, lake), it would be more effective to teach these issues. As reported, the learning can be more permanent when the students practice what they learned with regard to environment.

Key words: *Environmental Issues, Environmental Problems, Curiosity, Children*

1. INTRODUCTION

Turkey has started to experience a reform in the primary school curricula in the last few years. This movement is based on two main reasons; the process of joining the European Union, and transforming the primary school curricula from a subject-centered behaviorist understanding to a more student-centered constructivist understanding. Based upon the reform, the primary school curricula have been designed in line with contemporary approaches, in particularly constructivism (Erdoğan, in-press). Each dimension of the curricula is influenced by the constructivist trend. The curricula that have been developed for 1st -5th grades were firstly piloted in 120 primary schools. After getting feedback depending on the pilot application, the curricula were revised and then disseminated to all primary schools in Turkey.

The infrastructure of the primary schools has been enhanced in order to implement the new curricula effectively and efficiently. In addition, the new books for these grades were prepared in line with the new approach and curricula.

One of the courses developed according to new trends is science and technology course. Comparing to the existing science course (curriculum) for primary schools, the dimensions of technology, individual, society and environment have been integrated into the new science and technology curriculum. The former three dimensions were integrated in order to develop students' technological and societal skills and their science and technology literacy (Köseoğlu, 2006). The ultimate aim of integrating the latter (environment) dimension is to develop students' responsible environmental behaviors by increasing their curiosity, knowledge and attitudes.

Professional literature in Turkey and the World about the environmental education shows that there are excessive numbers of research carried out for determining students' environmental knowledge (*e.g.* Gökdere, 2005; Mogensen & Nielsen, 2001), environmental attitudes (*e.g.* Reid & Sa'di, 1997; Eagles & Demara, 1999; Erentay & Erdoğan, 2006), citizenship behavior and/or responsible behavior toward the environment (*e.g.* Erten, 2002; Tung, Huang, & Kawata, 2002) and the effects of students' demographic characteristics on cognitive, affective and action dimensions (*e.g.* Alp, 2005). However, the survey of the existing literature (or reached literature) reveals that there is no study targeting to determine students' environmental curiosity that refers to being eagerness to learn and explore the natural environment (*e.g.* its issues and problems). It is believed that the present study would contribute an insight to the professional environmental education literature to improve the curiosity dimension.

2. METHOD

2.1. Sample and Sampling

A total number of 99 fifth grade students comprised the sample of the study. The participants were selected from fifth grade students in three private schools, in which eco-school projects were actively carried out, in urban area of Ankara, capital city of Turkey. Before selecting the students, the aim and the scope of the study were introduced to all fifth grader in these schools and asked for their participation in the study. Then, 99 students indicated their voluntariness to participate in. Based upon their responses to the instrument, seven students were excluded from the study because they did not fill out all the items properly. The responses of 92 students (41 boys, 51 girls) were considered for the analysis. Table 1 summarizes students' gender and their parents' education levels.

Table 1. Students' *gender* and their *parents' education level*

			School-A	*School-B*	*School-C*	*Total*
Gender		*Boy*	25	9	11	41
		Girls	21	8	18	51
Parent Education Level	*Mother*	*Lower than Unv.*	25	10	1	36
		University	15	5	13	33
		Upper Unv.	4	2	15	21
	Father	*Lower than Unv.*	17	5	3	25
		University	21	7	8	36
		Upper Unv.	5	5	18	28

Parent education level was divided into three categories as lower than university, university and upper university. The category of 'lower than university' included parents who were illiterate and parents who completed or dropped any level of primary and secondary education. The category of 'upper university' included parents who earned either master or doctoral degree. All the students had a parent who completed at least secondary education.

2.2. Data Collection Instrument; ENCUQ

Data collection instrument used for the study was developed (Erdoğan, 2005) by considering the existing and newly developed elementary school curricula (in particularly 4th and 5th grade science education in existing curriculum and new science and technology education curriculum). Environmental Curiosity Questionnaire (ENCUQ) was basically designed to investigate students' curiosity level on environmental issues and problems and to determine their views about the implementation of environmental dimension of science and technology course curriculum; that is, instruction. After getting idea on content of the new and existing curricula, the possible items were written and the curiosity questionnaire was prepared. The questionnaire included two parts. In the first part of the questionnaire, the students were asked whether they were curious about selected environmental issues and problems. This part consisted of twenty-nine items on a four point Likert type scale ranging from 4 - *I am highly curious* to 1 - *I am never curious at all*. The students are also given a change to indicate other environmental issues and problems about which they are curious.

In the second part of the questionnaire, open ended question that targeted to investigate students' views on the ways of teaching and learning for environmental issues and problems. For this question, they were required to assume themselves as a teacher teaching for the environmental. Furthermore, they were given a separate sheet of paper and required to draw a picture of class in which they would like to be during learning for the environment.

The reliability analysis conducted with the same data (including ninety-two cases) indicated that Cronbach's Alpha reliability coefficient of the ENCUQ was .93. In order to ensure the content and face validities of the instrument, the items in the questionnaire were examined by one curriculum developer and two science teachers with regard to content coverage and understandability of the items for fifth graders.

3. RESULTS

This study was realized in fall semester of 2004-2005 academic year when newly developed science and technology curriculum was developed and pilot tested in 120 schools in Turkey. However, the schools in the study were not the ones that were piloted. The data gathered from the participants were analyzed by means of SPSS version 14.0. Students' responses to each item were described by use of mean, frequency and percentages. At the same time, in order to examine the effects of gender on students' curiosity level, independent t-test was performed.

Table 2 represents the individual mean value of each of twenty-nine items in the questionnaire. Greater mean value represents students' high curiosity on the selected environmental issues and problems. As clearly understood from the table 2, students' curiosity level was quite high. Few students reported that they had knowledge about some of these subjects and they were not curious about them.

The environmental issues and problems that the students were highly curious were ozone layer depletion, layers of the earth, global warming, endemic species of Turkey (Yanardoner plants), recycling of the water damps, greenhouse effects, alternative and clean energy (water and wind), underground sources of Turkey and environmental non-governmental organizations and societies (TEMA, KIR-CEV…etc). In addition to them, some students mentioned about some other topics such as environment and media relationship, wildlife in Turkey and action strategies on how to be environmental friendly and how to protect our environment.

Table 2. Individual mean scores of each item in the instrument

The subjects in the instrument	*Mean ($\overline{X}$)*
Ozone layer	3.60
Layers of earth	3.53
Global warming	3.51
Endemic Species	3.51
Recycling the water	3.49
Damps	3.46
Greenhouse effects	3.44
Alternative & Clean Energy (water, wind)	3.41
Underground sources of Turkey	3.40
Environmental Societies (TEMA…etc)	3.29
Endangered species (fauna & flora)	3.26
Medical waste	3.24
Energy saving	3.24
Erosion, flooding	3.18
Human and environment relationship	3.18
Solid waste (charges)	3.16
Recycling	3.12
Destruction of natural life	3.12
Individual responsibility	3.12
Endangered animals (toys…etc)	3.09

Table 2. Cont.

Air pollution	3.07
Citizenship responsibilities	3.07
Near & remote environmental problems	3.05
Types of environmental problems and their reasons	3.02
Effective use of water and soil resources	3.02
Negative effects of human being on the environment	2.99
Contribution of recycling	2.99
Noise pollution	2.91
Dissemination of information	2.87

The students were also requested to indicate the ways and the techniques more appropriate to raise students' attention toward and curiosity on the environmental issues and problems. They mentioned about the importance not only of outdoor activities but also of classroom activities. The activities and the ways that they suggested were doing project and experiments, lecturing, using simulations, discussion, observations, field and nature trips (e.g. trip to forest), organizing campaign(s), playing, small group works, journey, camp, drama, tree planting, and drawing picture.

The students also mentioned about the instructional media, equipments and sources in order to realize the methods and the techniques that they indicated. As they claimed, the visual sources would be more appropriate for getting attention and developing environmental curiosity. As an instructional media, VCD, computers and projector, OHP and transparencies, and blackboard; and as instructional sources, textbook, handout (photocopies), activity sheets, visual materials, power-point presentations, internet, newspaper, magazine journal articles, maps and figures were indicated by the students.

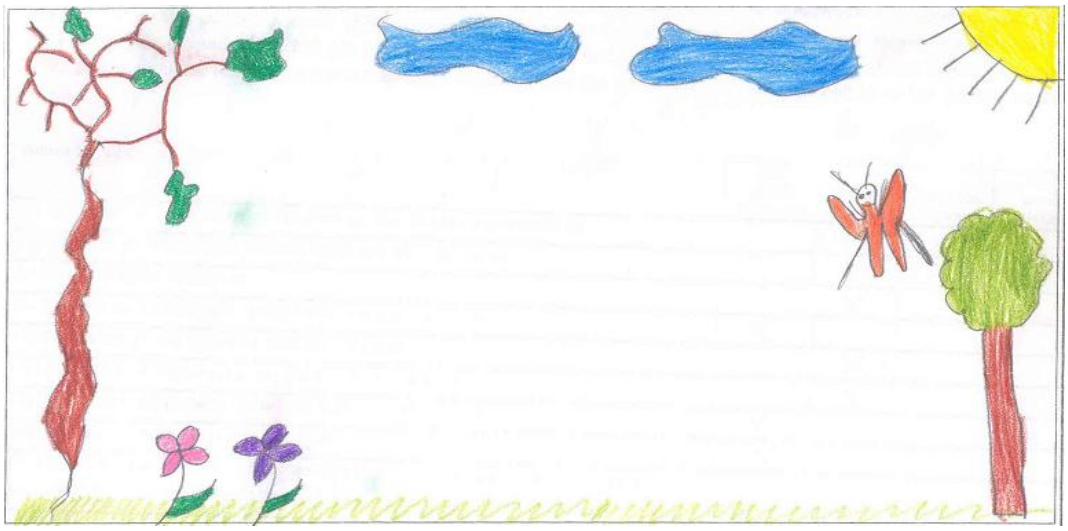
They believed that using the visual materials on the environment would contribute to raise students' curiosity on the environment. They believed that the environmental issues and problems could be learned more easily when these were studied in the natural environment. In addition, the learning can be more permanent when the students are given opportunities to apply what they learned in relation to the environment. They all agreed on the importance of the practice of what they learned. The outdoor activities that would give the students to apply their theoretical knowledge were field trips to the forests, factories and laboratories. One student reported that "*it is not effective to learn about the environmental issues and problems in class environment*". The natural environment was more effective because learning in the natural environment would enable them to observe what is going on in the real environment. The students further indicated that even school garden would be used to raise students' attention toward and curiosity on the environmental issues and problems. In conclusion, they would like to study environment related subjects by hearing, seeing, touching, experiencing, sharing and applying in the natural environment.

In the scope of the curiosity questionnaire, the students were also required to draw pictures of classroom environment in which they would like to study the environmental issues and problems. As clearly portrayed in the students' pictures, the natural environment is the best place to raise students' attention and curiosity and learn about the environmental issues and problems. They emphasized learning by doing, by seeing, by experiencing, by touching, by hearing and by living. Visual materials, field trips and forest trips were highly stressed in their pictures. They indicated that learning *for* the environment should be done in the natural environment to enhance the learning and make it more permanent. In this regard, one student imagined to be a teacher in the future and indicated that "[if I am a teacher who teaching environmental topics], *I will teach the environmental topics within the natural environment and I will take them* [students] *to field trips and forest trips".* The other student reported that *"I will teach the environmental topics in the forest together with the animals by showing clean and polluted air"*.

Two of the pictures drawn by students are given in picture 1 and picture 2.

Picture 1. A picture of the classroom environment drawn by one of the students (coded as Student-7).

Student-7 who drew the picture-1 explained why he portrayed this classroom environment as "[students] *get away from buildings and go to the green fields. When they see the environment with green, they love it* [the environment] *and want to keep the environment clean*".



Picture 2. A picture of the classroom environment drawn by one of the students (coded as Student-18).

Student-18 who drew the picture-2 indicated the importance of natural environment to enhance the learning and to get students attention and develop their curiosity. Student-18 believed that teaching in the natural environment enable the students to learn better and make the experiences permanent.

Independent t-test was performed to determine whether there is a significant difference between total scores of boys and girls with regard to environmental curiosity. The result indicated statistically significant difference [t (90) = -3.10, p<.01] in favor of boys. Put another way, fifth grade male students were more curios about environmental issues and problems when compared to fifth grade female students in these three schools.

4. CONCLUSION AND SUGGESTIONS

The study aiming to determine students' curiosity on environmental issues and problems was realized with 99 fifth grade students in three private schools in urban of Ankara. Their responses indicated that their curiosity level was quite high. As suggested by the findings, the students were basically curious about the global environmental issues and problems such as global warming, acid rain, ozone layer depletion and greenhouse effects. The research studies done in Turkey with primary school students indicated that the students had insufficient knowledge and misconceptions (unscientific and/or wrong knowledge) on some global environmental issues and problems such as acid rain (Bozkurt & Orhan, 2004), ozone layer (Bozkurt & Aydoğdu, 2004), greenhouse effects (Darçın, Bozkurt, Köse, & Hamalosmanoğlu, 2006), and some local ones such as erosion, water pollution, soil pollution, and air pollution (Çobanoğlu, Er, Demirtaş, Ozan, & Bayrak, 2006). When considering the results of previous studies presenting students' lack of knowledge on the environmental issues and problems, the results of the present study are manifest and expected. Combining the previous results and the present results, it can be easily interpreted that the students seem to be quite eager to learn and explore the natural environment (particularly its issues and problems) to get more knowledge since they might possibly have insufficient knowledge about its issues and problems.

From the curriculum development point of view, the students believed in the importance of student-centered approaches, the ones that emphasizes active student participation, and out-of-class activities such as nature trips, forest trips and field trips. Furthermore, they suggested making the instruction visual by making use of different kinds of instructional aids (*e.g.* OHP and Computer) and resources (*e.g.* internet and posters) to improve the learning. Since the curriculum development requires a process and is an evolving process, the suggestions and feedback taken from the students should be considered and incorporated into the curricula. The new science and technology course curriculum seems to satisfy students' needs because it has been developed in line with student-centered approaches. Further studies that would be designed as qualitative should be conducted to observe the implementation of the curriculum and to determine whether students' needs are met or not.

The male students seemed to be more curious about the environmental issues and problems than the female ones. The study done with 458 students in 4^{th} – 8^{th} grades pointed out there was no significant mean difference between 4^{th} - 5^{th} grade male and female students with regard to environmental attitudes (Yılmaz, Boone & Andersen, 2004). The other study done with 135 6^{th} grade students seemed to support the non-significant mean difference (Tuncer, Tekkaya, Sungur & Ertepınar, 2005).

On the other hand, the other study done with 6^{th} and 8^{th} grade students indicated that there was no significant mean differenced between male and female students with regard to environmental knowledge, but female students tended to show more positive attitudes when compared to the male ones (Alp, Ertepınar, Tekkaya & Yılmaz, 2006).

Although there was no significant effect of mother and father education level on students' environmental curiosity on the selected topics, the students with high parent education level seemed to be more curious about the environmental issues and problems.

This study is limited with the number of the students and the number of the school considered. For further researches, a group of students who has different background in terms of SES, age, grade, residence and school type should be invited in order to see the effects of different categorical variables on students' curiosity about the environmental issues and problems.

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PROMOTION OF NURSERY SCHOOL TEACHER AND JUNIOR GRADE[27] TEACHER EDUCATION FOR ENVIRONMENT AND SUSTAINABLE DEVELOPMENT IN CROATIA

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The empiric data used in this work were gathered within a broader research called *Further preschool teacher and junior grade teacher education for environment* which was approved by the Ministry of Science, Education and Sports of the Republic of Croatia in 2001.The investigation was implemented on the sample of 283 preschool teachers and 202 junior grade teachers and was aimed at determination of their education practice and needs for future education for environment and its sustainable development.In addition, the purpose was to test whether there are differences between the mentioned professional profiles of educational employees.The results indicate that there are statistically significant differences concerning evaluation and that past practice of education for environment is, in several segments, dependent on a professional profile.What was also determined is a single-factor structure of the contents needed for future education and development of skills and abilities within the context of education for sustainable development.Looking at the whole, the research results indicate that, with certain cautiousness, it is possible to determine single approaches in evaluation of practice of nursery school teacher and junior grade teacher education for environment.It is also possible to determine the educational needs which are to a large extent mutually similar concerning the development of skills and abilities but to a lesser extent different concerning the evaluation of content selection in education for sustainable development.The authors draw attention to the educational employees, the significance of recognising their educational needs, taking the critical view of past practice and creating a new education for sustainable development of the environment for them.

Key words: *environment, sustainable development, nursery school teachers, junior grade teachers, practice of education for environment, educational needs for sustainable development.*

1. Introduction

First of all, what needs to be pointed out is the following: On one hand, numerous efforts for the public *agreements* encourage regarding the need for urgency initiation that refers to the sustainable life style of future generations and their enjoyment in the quality of living.On the other hand, however, this issue significantly affects the problem of understanding.In other words, the issue of sustainable development has a direct impact on all people but general understanding of all these problems and their significance is rather low. Furthermore, while education is long present as a key instrument for human consciousness raising refered to environment and sustainable development, *the rules* that support practical educational changes are nearly not present at all *(Stokes, Edge, West, 2001: Environmental Education in educational systems in European Union – final report; xxx, 2003: An international conference on Education for Sustainable Future; UNESCO, 2004: New Role of Education. Beyond Basic*

[27] refers to the first four grades of primary school

*Education to Education for Sustainable Development; Uzelac, 2002: Obrazovanje studenata učiteljskih škola/Nastavničkih fakulteta za okoliš; Uzelac, Pejčić, 2004: Od ekološke (ne)pismenosti prema cjeloživotnom učenju za održivi razvoj; Uzelac, Pejčić, 2006: Stilovi odgojno-obrazovnog rada odgajatelja i učitelja u području okoliša – procjene stanja i implikacije).*The implementation of such changes calls for educated professionals, especially teachers.If their number is not sufficient, what else can be said but: they are to be educated!

2. Methodology of research

Research problem and aims

In order to provide a better understanding of the problem of nursery school (preschool) teacher and junior grade (primary school) teacher education for environment and sustainable development, and, therefore, an adequate help, it is important to know to which extent is this problem also the problem of the past practice of our examinees and to get information about their educational needs for future education in the field of environment and sustainable development.The group of our examinees is particularly interesting due to the fact that, among other things, they can be divided in two smaller groups: the ones who can sense the problem of their education in the field of environment but are not educated enough and the ones who sense that problem to a lesser degree and are less inclined to such education.

In accordance with all this, the following aims are set :

1. to determine certain dimensions of the past practice and future of nursery school teacher and junior grade teacher education for environment and sustainable development
2. to check if there is a difference between nursery school teachers and junior grade teachers concerning some characteristics of the past practice of education for environment
3. to check if there is a difference between nursery school teachers and junior grade teachers concerning their sense of having the educational needs for future education in the field of environment.

A questionnaire that was previously made within a broader research *Further preschool teacher and junior grade teacher education for environment*, was also used in this research. In lesser part, it was formed on the basis of two questionnaires used in earlier researches: *Environment – education – preschool teachers / junior grade teachers (Uzelac, 1996)* and *Education of teacher education college / faculty students for environment (Uzelac, 2002)*, while in larger part it was based on Huckle's works.It encloses some characteristics of the past programmes of nursery school teacher and junior grade teacher education for environment – *information accessibility in the context of the past practice of nursery school teacher and junior grade teacher education for environment*.The scales of the past practice of education for environment are scored as follows: 1 = definitely not, 2 = mostly not, 3 = mostly yes and 4 = definitely yes.The questionnaire also encloses certain content related needs, as well as needs for the development of individual skills and abilities referring to future nursery school teacher and junior grade teacher education for environment.The scales of educational needs comprise of 21 particles referring to *content related needs*, and 9 particles referring to *the development of skills and abilities in the context of education for environment and sustainable development*.The reliability of the scale of content related needs is 0.92, and of the scale of skills and abilities 0.80 (Cronbach's test).The scales of future education for environment are scored as follows: 1 = low need, 2 = medium need i 3 = high need.The examinnes were expected to mark the single statement frequency or choice with an X.

2.2. Procedure

The research was implemented on a sample of nursery school teachers and junior grade teachers in Zagreb, Rijeka, Split and Osijek, in April and May 2005.Due to this work needs, the examinees' data were included in the statistical analysis and divided in two categories: nursery school teachers and junior grade teachers.The category of nursery school teachers consists of 283 or 58,2% of the examinees, and the category of junior grade teachers consists of 202 or 41,6% of the examinees.

2.3. Methodological remarks

Since there was a small number of researches implemented in the Republic of Croatia, whose interests also are educational employees and their education for environment, the researchers encountered some problems of methodological nature.Before all, this refers to the questionnaire structure.However, we believe that further examining would contribute to its improvement.

Taking into consideration that the results of this research are based on nursery school teacher and junior grade teacher self-assessment (what is also a methodological problem!), further researches should also include the assessments of other factors that would contribute to objectivity linked with the assessment of current state and vision of nursery school teacher and junior grade teacher education for sustainable development of environment.

Regarding these further researches and in order to make the sample more representative, it might be useful to include some other nursery school teachers and junior grade teachers who work in different conditions.

3. Results and discussion

The data processing, whose results are outlined in this work, is implemented by the use of some standard statistical procedures (aritmetic mean and standard deviation). Since one of the aims of this work is comparison between examinees with different professional profiles, some adequate statistical tests were also used.A t-test was used in the analysis of importance of the differences of artimetic means and a factor analysis with common factor was derived.

3.1. Practice and needs of nursery school teacher and junior grade teacher education for environment and sustainable development

3.1.1. Information accessibility in the context of current practice of nursery school teacher and junior grade teacher education for environment

From the level of their comparison, it can be seen that the junior grade teachers used all three statement scores more frequently than the nursery school teachers, linked with the accessibility of information about environment.In other words, what is obtained is a statistically significant difference concerning their statements: *A nursery school/primary school has at its own disposal enough literature on education of nursery school teachers and junior grade teachers in the field of environment* ($t = 2.86.$; $p = 0.004$), where a larger assessment is given by junior grade teachers ($M = 2.84$) than by nursery school teachers ($M = 2.64$); *Nursery school teachers and junior grade teachers have access to data relevant for education in the field of environment* ($t = 4.30$, $p<0.001$), where a larger assessment is also

given by junior grade teachers (M = 2.99) than by nursery school teachers (M = 2.68); and *Nursery school teachers and junior grade teachers use contemporary educational technology in order to improve data flow and communication linked with education for environment (PC, electronic mail, etc.)* ($t = 6.57$; $p<0.001$), where a larger assessment is as well given by junior grade teachers(M = 3.00) than by nursery school teachers (M = 2.49).

The research shows that the information accessibility in the context of the current practice of education for environment is tied to a profile of education in such a way where junior grade teachers outline a larger information accessibility. The obtained results could be explained by some characteristics of educational work in junior grade teaching, different styles of junior grade teacher education, as well as by bigger concern of the schools these teachers work in, regarding their education and improvement in the field of environment. On the other side and compared with the junior grade teachers, the nursery school teachers have probably less interest in a question of possible integration of literature and contemporary educational technology into the process of education for environment.We are fully aware that this dimension is just a subsidiary indicator in the analysis of the current state in the practice of education for environment, which is, needless to say, imprecise as well in relation with educational programmes.However, due to the current inaccessibility of other data, we are obliged to use it as an indicator of the phenomenon of education for environment.

3.1.2. Content related needs in the context of future nursery school teacher and junior grade teacher education for environment nad sustainable development
For some time past, nursery and primary schools in the Republic of Croatia have not been following desirable trends of education for environment, programme enrichment, massification, etc.It is indicative that the process of such education is even less observable, especially when talking about nursery school teachers and junior grade teachers.

In order to get a more complete insight in the examined, content related, educational needs, we shortly introduce some of them and their medium values.The results obtained indicate that the nursery school teachers evaluated 12 statements (out of 21) and junior grade teachers evaluated 11 statements (out of 21) referring to the contents of education that have been provided to them, and they used marks 2 and 3, that is, *medium need* and *high need*. *The highest average marks* given by nursery school teachers refer to the following three statements: *Preserving the future of environment (M=2,88); Importance of cultural, social, economic and biological diversity of environment (M=2,72)* and *Impact of personal action on environment and its sustainable devlopment (M=2,70)*. The contents most necessary for the junior grade teachers are those referring to: *Preserving the future of environment (M=2,80); Preserving and rational use of environmental goods (M=2,67)* and *Impact of technology on environment (M=2,66)*. However, it needs to be said that the educational need which got lowest marks from the examinees was: *Political dimension of the aspects of sustainability (M=2,12; M=2,20)*. Therefore and according to the degree of acceptance of these statements, we can say that the examinees are open for the entry of new contents in their own education.

On the next level of the analysis and in order to examine the structure of the contents referring to education for environment and sustainable development, a factor analysis of needs for different contents was derived and a number of 21 needs was included in it. The factor analysis with common factors was derived and the Scree test was used as a criterion for an extraction of a sufficient number of factors. Its results indicate that in the basis of all the examined needs there is one general factor that explains 35.14% of common variant (varijanca) (the first five eigen values are 8.02, 1.73., 1.46, 1.10, 1.03). Table 1 shows a factor matrix of the needs analysed.The reliability of this factor internal consistency (Cronbach alpha) is very high with the figure of 0.92.

Table 1. Factor matrix of the needs for different contents in future education for environment and its sutainable development

NEEDS	FI
Ethical dimension of environment / sustainability	0.70
Psychological dimension of environment / sustainability	0.66
Impact of technology on environment / sustainable development	0.64
Aesthetical dimension of environment / sustainability	0.64
Changes and development within the current capacity of environment	0.63
Impact of poverty on environment / sustainable development	0.60
Importance of cultural, social, economic and biological diversity	0.60
Impact of human communities on environment/sustainable development	0.60
Civil rights and responsibility for environment/sustainable development	0.60
Interdependence of society, economy and natural world	0.59
What is education for environment / sustainable development?	0.59
Political dimension of the aspects of environment / sustainability	0.59
Impact of personal action / activity on environment / sustainable development	0.58
Equality and justice	0.58
Role of authorities and business world and their responsibility for environment / sustainable development	0.58
Educational technology in the field of environment	0.57
Problem of integration of education for environment / sustainable development	0.57
Local activities and their possible global effects	0.57
Strategy of teaching for environment / sustainable development	0.53
Preserving and rational use of environmental goods	0.52
Preserving the future of environment	0.47

Taking into consideration the meaning of these statements, it seems justified and suitable to say, first of all, that this factor is the indicator of free choice of contents in the field of education for environment and its sustainable development.At the same time, we can say that there are also highly interconnected educational needs among the examinees.Therefore, this factor can be considered as their optimistic orientation towards future education for environment and sustainable development.It is, after all, one of the top priority tasks of the institutions where they work, that is, of the whole society.Namely, considerations about the meaning of the stated factor indicate that education for environment is or should be understood as necessity and the object of possible and desirable professional and scientific

discussions and actions. Regarding the fact that our examinees had belonged to different professional profiles of educational employees, on the next level we completed a t-test whose purpose was to identify potential differences among them (Table 2).

Table 2. Differences with regard to professional profile

Independent variables	M	SD	T; P
Nursery school teachers	52.81	7.74	t=0.31; p=0.753
Junior grade teachers	53.05	8.08	

Regarding the professional profile, the research shown that it has no significant influence on the examinees' views of the choice of educational contents.Namely, the nursery school teachers and junior grade teachers do not differ significantly considering some average results linked with this factor. There is a minimal difference between these two groups of teachers and their answers are in a rather close coordination.Therefore, it is clear that professional profile has no significant influence on the views linked with this issue. It can be presumed that, while determining their educational needs, both groups of the examinees first assessed their own position in children's / pupils' education and the feeling of expectation coming from other factors in the environment.In short, the data synchronously show some aspects of pluralism and individualisation.In other words, the process of education of educational employees for environment is possible with the contents presented and where primary groups are formed of nursery school teachers and junior grade teachers

3.1.3. Development of skills and abilities in the context of education for environment and sustainable development

Our intention was to test whether it is possible to set apart any dimension that, to a certain extent, explains the degree of answer variability in all the statements. That is, in order to test the structure of the offered statements, a factor analysis of the needs for the development of single skills and abilities was derived referring to future education for environment and sustainable development.A number of 8 skills and abilities was included in the analysis and a Scree test was used as a criterion for an extraction of a sufficient number of factors.The projections of single particles are shown in Table 3. The test results indicate that in the basis of all the examined needs there is one general factor that explains 33.92% of common variant (varijanca) (the first five eigen values are 3.37, 1.21, 0.80, 0.67, 0.54). The reliability of internal consistency (Cronbach alpha) is satisfactory, with the figure of 0.80.

Table 3. Factor matrix of skills and abilities referring to future education for environment / sustainable development

SKILLS AND ABILITIES	FI
Development of higher skills that include analysing, synthetising and formulating the conclusions linked with sustainable development	0.68
Development of abilities of considering different points of view and reaching the compromise of thoughts linked with sustainable development	0.60
Development of abilities of critical evaluation of personal and other people's experience linked with sustainable development	0.60
Development of communication skills such as introduction of ideas, asking and locating questions and presenting rational arguments linked with sustainable development	0.59
Development of ability to work in a cooperative way on planning and implementing the tasks linked with sustainable development	0.56
Development of skills of evidence analysing and identifying partiality within arguments and evidence linked with sustainable devlopment	0.53
Development of skills of active learning where one has to reach the information linked with sustainable development independently	0.53

According to the examinees' perception linked with this factor, we can say that there are highly interconnected opinions of the development of certain skills and abilities in the context of education for environment and sustainable development. At the same time, we can also say that the examinees, more indirectly than directly, believe that the development of adequate skills and abilities will raise education for environment on a higher level. Finally, based on the dimensions obtained from the factor analysis, we notice that our examinees here as well express an optimistic orientation towards their own future education for environment and sustainable development.

According to the t-test, the examinees did not show statistically significant differences regarding the scale of overall average results (Table 4). In other words, by the analysis of the aritmetic means, we notice that there is no deviations. This could be explained in various ways but what seems important in this case is the closeness of the two different categories of professions of educational employees. The examinees belong to such educational professions

that are, regarding their practice, among first to be responsible for the development of children's / pupils' sensitivity for different issues of environment, that is, its preventive preservation. Therefore, the examinees hold similar opinions of the mentioned skills and abilities in the context of their own education for environment and sustainable development. All this could be extremely important for supporting and facilitating the proces of future nursery school teacher and junior grade teacher education for sustainable development.

Table 4. Differences with regard to professional profile

Independent variables	M	SD	T; P
Nursery school teachers	18.93	3.13	T=0.43; p=0.669
Primary school teachers	18.80	3.46	

4. Conclusion

Based on a discussion about practice and future of nursery school teacher and junior grade teacher education for environment and sustainable development, the general conclusion is that the examinees indicate a rather similar situation. At this time, we can generally say that the junior grade teachers use some more successful strategies of education for environment. However, looking at the viewpoint of reforming global educational space whose important component is nursery school teacher and junior grade teacher education for environment, we believe that further improvement of this kind of education is not questionable at all, regarding other educational employees as well. In any case, the results indicate the need of correction of wider social-pedagogical views where educational employees are hold only responsible, instead of equally responsible together with all other active participants of society. Another important conclusion is that the improvement of certain measures of education for environment could reduce huge social-pedagogical damage where the postponement of youngest generation education, that is, preschool age children and primary school pupils' education for environment is considered to have harmful consequences. In other words, educational influence on children / pupils will surely be put into question in a long term absence of qualitative communication between society and educational employees. In this respect and taking the determined and analysed results as a starting point, we offer certain generalisations of the solutions referring to the attempt to define lifelong learning for environment pedagogically. (Appendix: POSTER)

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LIFELONG LEARNING AS NEW PARADIGM OF EDUCATION FOR ENVIRONMENT AND SUSTAINABLE DEVELOPMENT WITHIN THE CONTEXT OF PROFESSIONAL IMPROVEMENT OF TEACHERS ORIENTATED TOWARDS DIRECT RESEARCH OF EDUCATIONAL PRACTICE

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The author holds that education is the key factor of sustainable development promotion and improvement of human abilities to solve the issues of environment and development. Therefore, she supports the strategy of lifelong learning as a paradigm of education for environment and sustainable development within the context of professional improvement of a teacher orientated towards a research of educational practice. Reflective practice is also introduced in this work, as a way of learning and researching.

Key words: *lifelong learning, culture, education for environment, sustainable development, reflective practice, professional improvement.*

Consideration of the quality of living, along with the imperative of preserving the natural environment, lay stress upon the importance of its social and cultural dimensions as important components of sustainability. In this sense, social, ecological and economic aspects are considered to be inseparable components of sustainable development. The focus of our attention is the social component which brings man and its overall social organisation to the fore and is considered from pedagogical aspect, while the structure of culture, cultural dynamics and the position of man in cultural environment is its core dimension. In this matter, the notion of culture is accepted as determined by Ogbu (1989), that is, as the entirety of the way of living of certain human group, the network or system of accumulated knowledge, customs, values and behavioural patterns whereby the basic question is being solved – the question of one's own survival. Schein (1998) argues that culture could be described even better, as 'value in action' that includes whole organisations and not just a number of key individuals. Culture is expressed through practice and statements / claims, through ways people act and express themselves. Culture is a value or style of living, the way we consider and develop the system of values referring to education for environment and sustainable development.

The UNESCO's report from 2002, called 'Education for sustainability – from Rio to Johannesburg', shown what was learnt about education for sustainable development during the decade (1992 – 2002). Due to the needs of our consideration, we single out the determination of sustainable development as a dynamic concept in the process of development, whose aim is to train people at all ages for lifelong learning and taking the responsibility for the creation of sustainable future. Namely, the vision of education for sustainable development presumes a large number of mutually connected elements that, stronger or weaker, directly or indirectly, have a multiple influence on each other (Lay, 2003, 312). While previous teacher education refered firstly and only to the 'elitist' part of teachers that included biology and geography

teachers or some commited teacher groups recognised as prominent school 'enthusiasts' that, more or less, participated in the work of education for sustainable development, the situation has changed lately and the emphasise has been moved from those teachers to the whole of teacher population (Uzelac, 2004, 9).

Among other things, contemporary consideration of education gives an exceptional attention to the topics belonging to environment and sustainable development, whose purpose is a complete analysis and comprehension of its regularities, complex interactions and problems. The hope linked with the possibility of current and future problems solving can be based on the presumption of development of creative abilities, empathy and readiness for young generation activity. Therefore, it is extremely important to build, support and promote unity and qualitative communication, reflection, discussion and debate in a careful and systematical way, as they represent one of the possible ways of realizing sustainable development. Furthermore, what is emphasised among the tasks of contemporary education is education for human values and respect of human rights, as well as for cultivation of democratic relations, aimed at realizing the potential of every individual and young people's training for confrontation with hazardous factors of social environment in terms of reducing their effects. Education for environment fits completelly into such orientation and can often serve as a way or model for its realization. Education for sustainable development is an integral part of humanistic education which proceeds from the fact that everybody is valuable by themselves and has a right on qualitative life, which also includes the implicity of recognizing and providing the same rights for other people and nature.

School has to become the place not only for student learning and researching but also continual teacher experimenting with learning and teaching (Joyce, Bennett, Bennett, 1990), and in this respect, the place where education for environment and sustainable development realizes. An author that has been for a number of years systematically dealing with the problem of education for environment and sustainable development in the Republic of Croatia is Vinka Uzelac (1996, 1999, 2002). Referring to the professional teacher development and a comparative analysis between our various national programmes and the programmes of other European countries, she thinks that 'making a valuable practical experience of one part of the teachers a property of other teachers by establishing the connection between educational practice in schools and the environment where they act, and increasing the international cooperation in the field of education for environment' (Uzelac, 1999, 103) is a necessity.

In this matter and observing all the complexity of defining the problem of professional teacher development for sustainable development, Gayford holds that professional teacher development for sustainable development should be seen as a challenge, advocates the conception of wider development process and directs to the need for a different politics of professional teacher development, that is, the possibility of different orientation of teacher education for the sustainability of environment, along with the recommendation of the measure called stimulation of an innovative approach (Uzelac, 2004). This includes the opportunity for teachers to explain their own ideas about the nature of sustainability and education for sustainability, to construct and explore possible models of comprehending the education for sustainability, to use the methods of understanding and applying the possible teaching strategies and to consider the way of evaluating the approaches to education for sustainability.

Therefore, lifelong learning as a new paradigm leads to significant differences of traditional ecological education, that is, education for environment and to new education for sustainable development. Namely, lifelong learning is of a key significance for achieving general sustainable future (Lemke, 2000, Memorandum o cjeloživotnom učenju, 2000, Pastuović, 2002). The aim is to think out a general strategy for introducing lifelong learning on individual level, as well as on institutional level, and in all domains of public and private life. Lifelong learning is not anymore just a form of education and training but needs to become a leading principle in society, especially within the whole of the context of learning / knowledge acquiring, as a new paradigm of education for environment and sustainable development.

Professional teacher improvement is considered to be a continued lifelong process where professional teacher knowledge is being tested, revised and gradually expanded through shared exploration of their own practice. For this reason, each individual should be trained for learning throughout their lifespan in order to adapt continually to the changeable, complex and interdependent world. Society of future is the society that learns. In this regard, it is obvious that educational system, that is, preschool teachers, teachers, professors and all the others included in education, should play the key role. This relative viewpoint that might be called 'learning relation' will become a dominant distinction of society (Delores, 1998).

Nowadays, when new technologies and cognitions are used, Glasser (2000) calls the attention to the need of redefining the definition of education: education is application and advancement of knowledge. The value is in using what we have learnt. The definition of education as learnt knowledge is outdated and called schooling by Glasser. Education is worth every effort, schooling is not. Education is worth improving, schooling cannot be improved. In real life, people learn how to use knowledge, acquisition alone is not enough.

Stoll and Finka (2000) say that lifelong learning that covers both, students and teachers, is a norm in effective schools, and what is being stressed is development of schools as learning organisations. In this matter, teacher improvement, that is, lifelong learning is at the same time a process and desired outcome of school improvement, looking from the aspect of education for environment and sustainable development. The notion of sustainability is differently defined in numerous contexts. The following definition, however, is being cited frequently: sustainable development is defined as development that meets the needs of the present time, in a way that does not threaten the possibilities of future generations to meet their own needs (Šimleša, 2003, 404). Regardless of the other numerous possible definitions of sustainable development, we almost always hold that sustainable development is a leading idea and concept whose role is positioned between business and environment protection, and this is where Cifrić draws his conclusion that sustainability is a process and sustainable development is an approach to that process (Cifrić, 2002, 9).

Therefore, if practitioners and professional teams want to be sure that processes of learning will move in the direction of sustainable development process, they are to ask three questions:
1. To what extent is my institution also the organisation for adult and children's learning?
2. Am I a part of the organisation for learning and researching?
3. How can I play my role in the development of my own institution as an organisation for learning and researching – regarding me, my colleagues and partners?

If teachers participate in improving the quality of their institutions in entirety, what also includes education for environment and sustainable development, and not just within their classroom, the improvement of teachers takes place in the largest sense because they become part of the organisation that learns and explores, where they are considered to be daily responsible for their own development as well as for the development of their colleagues.

In this sense, Senge (2001, 26) holds that 'the basic significance of 'a learning organisation' is a continual building up of the ability of creating its own future. It is not enough for an organisation to survive. What needs to be added to 'learning to survive', oftener called 'adaptive learning' is 'creative learning' that increases our ability to create'.

This means that what also needs to be developed besides the development of new knowledge and skills of teachers, is a new attitude towards professional improvement that is manifested in teacher readiness for excepting the role of a researcher, that is, taking the initiative for creating instead of consuming new knowledge and new practice (Hopkins 2001), as well as new cognitions that belong to the domain of education for environment and sustainable development.

Our experience shows that training teachers for researching and including them in the research of educational practice is a right way that leads towards qualitative professional improvement and creative learning that develops reflective and self-reflective practice.

Reflective practice is a holistic process that introduces such way of learning and researching where theory is integrated with reflection (thinking) and practice, and where reflection is the core of the process of learning and changing. On one hand, it is a dialogue between an objective and normative theoretical knowledge, and on the other, it is a contextual and subjective practical experience where individual variations of preschool teacher / teacher work are formed. What becomes prominent in this context is learning as a dynamic and complex process that includes creative thinking, assessment of the choice of decision and research. Many authors that studied reflective practice consider this model an alternative against the traditional and positivistic approach to practice changeing (Hammerslay, 2002; Elliot, 1990; Elliot, 1998 etc.).

A reflective practitioner is an active individual who explores various solutions and ways of activity as an answer to practical problems. 'He / she is characterised by 'reflective openness'' that takes place when we are willing to re-examine our own thinking and become cognizant of the fact that every viewpoint we can reach is, in the best case, just a hypothesis about the world. No matter how recognizable it is and to which extent we are inclined to 'our idea', it is always subject to reconsideration and improvement' (Senge, 2003, 266).

The development of an reflexive approach to practice and the creation of reflexive practice represent a new conceptual and methodological approach to practice which is most often based on an active research as an approach of researching and improvement of the process of learning and teaching, and which takes place as an opposition to technical and rational (traditional) model of practitioner's preparation. Knowledge is built in an action itself, in analysing and considering one's own or other people's moves, and reflection is not only pure mental activity but spreads further out to practice and action.

We are talking about the shift from a traditional conception of education directed to knowledge to a socio – constructivistic learning. The process of learning and gaining professional competence through reflective practice is linked with the notion of lifelong learning as a process of continual personal improvement by 'continual purifying and deepening of our own vision, directing our strengths, developing patience and an objective consideration of the reality' (Senge, 2003,20). In the light of lifelong learning, Rinaldi (1995) views a reflective approach to practice 'as a permanent strategy of learning (Senge, 2003, 47), and consequently, there is a need of abandoning the old stereotypes in pedagogical practice that are far away from reflection, observation, documenting, debate and unpredictable, that is, genuine education. Therefore, he thinks that learning is a continual teacher work. Regarding reflective practice, learning does not take place in 'the unity of an individual and practice' only but in the unity with their colleague as well.

In our action research implemented in Istra, Croatia (Miljak, Vujičić, 2002) and along with all the participants in the process (preschool teachers, headmasters / headmistresses, pedagogues and parents), we directly explored and changed educational practice in every single institution. According to the possibilities and conditions in every institution, the new practice was directed to non-violent, gradual, democratic and genuine environment.

Professional improvement that is directed to the research of personal practice in nursery schools (that is, we might add, educational groups) provides not only the opportunities for an individual development of preschool teachers but also the opportunities for the development of cooperative relations within an institution and beyond, through the formation of networks of cooperative nursery schools – professional communities that learn.

In this sense, we think that the educational system, that is, schools and nursery schools need to be redesigned, transferred into learning organisations where change occurs continually (because change is continuum itself), and that all this needs to become a part of ordinary, everyday life and sustainable development. Many authors hold the same view, especially Fullan (1993), Stoll and Fink (2000) and others. Educational organisations are living systems, organisations that learn by themselves and improve continually. The aim of education for future can be observed in the use of new technologies and cognitions, rapid development of the society that expects citizens who are proactive, show initiative, responsible to apply knowledge, create innovations and initiate such events that are in accordance with environment and in direction to sustainable development.

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STANDPOINTS OF PARENTS AND EDUCATORS TOWARDS TASKS OF ENVIRONMENTAL EDUCATION IN KINDERGARTEN

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This article presents research results of standpoints of parents and educators towards tasks of environmental education in kindergarten. We researched the standpoints of parents and educators towards the tasks of environmental education by means of a descriptive method of empirical pedagogic research. With the exception of collective standpoints of parents and educators towards the tasks of environmental education in the cognitive area, we established several differences, which correspond to understanding of the role of environmental education, consideration of developmental requirements of children, development of creativity, independent conflict solving, self-determination, orientation towards success and subordination to adults.

Keywords: *pre-kindergarten child, kindergarten, parents, educators, standpoints, environmental education.*

1 Definition of the subject

Child's development and his learning process are greatly dependent on the standpoints of the parents, which are based on their views of what the child has to learn and how he should learn (Colberg-Schrader, Krug, Pelzer, 1991). Together with parents and family, educators and kindergartens also play an important role in the upbringing of pre-school children. Goals, contents, methods, personnel and their education, didactical and other means and kindergarten organisations are all important factors in child's development and his socialization. Therefore it is understandable, that experts have been discussing the goals and tasks of pre-school upbringing for almost two decades. In these discussions experts and parents sometimes support the cognitive direction of development and sometimes the social and emotional direction.

Based on the historical facts, we established, that the society in which the child is brought up, has a major influence on the definition of upbringing goals. We could assume that there are differences in understanding of upbringing role of kindergarten between professional educators and parents of pre-school children (the later bring up their child mostly intuitively, without any deliberate or established pedagogical standpoints). The discrepancy between the goals of both groups has an effect on the upbringing process and with that also on the child's socialization. Different evaluation of upbringing goals between the educators and parents lead to many misunderstandings and conflicts, which result in permanent problems in the upbringing process. This is best demonstrated y the following example: if the parents do not stimulate the child's independency (dressing up, feeding) and instead of this do most of these activities themselves, while the educators in kindergartens focus a lot on development of child's independency, a conflict arises regarding the basic tasks of upbringing praxis, which has a negative effect on the child's socialization.

Knowledge of parents, their standpoints towards the upbringing of their child and their upbringing is one of the fundamental questions of upbringing, which has been neglected in the past. Knowledge of both parents and educators standpoints, regarding the tasks of upbringing and tasks of environmental upbringing, is one of the basic requirements for better understanding of upbringing effects and is the predisposition for successful communication between the educators and the parents.

Research focusing on the problem of parents and educators standpoints regarding upbringing of family and kindergarten has been conducted by the following researchers: Dzuibek (1985), Bronstrup and Rossbach (1987), Špoljar (1989), Gaylen (1990), Okagaki and Sternberg (1993), Cugmas (1994, 1999).

All these research focused on the common basic problem – standpoints of parents and educators towards the upbringing in family, kindergarten and school.

D. Dziubek (1985) has already in the 1980's researched the standpoints of elementary school teachers towards environmental education in North America. Based on his research, he came to the following conclusions: pre-school institution is the institution where systematic environmental education should commence, environmental education should be integrated in all areas of education, teachers are badly prepared for environmental education and a large part of the teachers are not familiar with the national goals of environmental education. We believe that these conclusions are still valid today.

We argument our conclusion with the following: even if the environmental upbringing is systematically started (or should start) with the acceptance of child into the school (Uzelac in Starčević, 1999: 9), the environmental upbringing of child begins with the birth of his parents (Andras, 1998) and continues in his family and kindergarten.

Modern approach towards environmental upbringing is based on a holistic approach to the child and on the principle of integration between individual (school) subjects, respectively education content (in kindergarten). Marentič-Požarnik (1998) believes that discussion regarding any important problem in the field of environmental upbringing is not possible. The author also claims that it is not even possible to analyze or find solutions without linkage of different subjects and fields (physics, chemistry, psychology, history, sociology, economy, etc) by ethical dimension.

We presume that in the US state Pennsylvania, in which the author Dziubek, 1984, conducted his research, the systematic introduction of environmental education in pre-school institutions and elementary states has begun. Unfortunately we have no information about these activities.

N Gaylen (1990) researched the standpoints of parents towards environmental upbringing in kindergarten and elementary school. Gaylen believes that the environmental upbringing includes:

- learning about natural environment, which is a product of man and his work,
- learning of mutual relationships in environment

Environmental upbringing can be conducted on any level - from pre-school institutions to college, in playground, classroom or in nature. Gaylen believes that environmental upbringing adopts a holistic approach towards the child and the world surrounding the child, in order for us to be able to take care of our surrounding and live in harmony with the environment and other people.

The research showed that parents have positive standpoints towards the environment, that parents care about the upbringing-educational programmes for their children and that they are concerned with the ever increasing pollution of the environment. Gaylen established that parents with higher education have more positive standpoints towards environmental upbringing.

2 Research goals and the purpose of research

Based on theoretic findings, analysis of relevant literature about environmental upbringing as well as results of empirical research the general goal of this research is identification of elements of environmental upbringing in kindergarten in the context of modern environmental upbringing.

The research goal is to establish if there are differences in the standpoints of parents and educators and evaluation of importance of tasks of environmental upbringing in the cognitive field.

2.1 General methodological approach and research methods

We conducted our researched based on an empirical-inductive general methodological approach. Using the empirical-inductive approach we researched the standpoints of parents and educators towards the tasks of environmental upbringing, while relying on a descriptive non-experimental method of pedagogical research.

2.2 Research sample

Research sample was chosen from a population of educators and parents of pre-school children from kindergarten in the region of Republic of Slovenia, and represents 164 educators and 248 parents.

2.3 Methods and instruments of data acquisition

During the acquisition of data we took into account the principles of voluntariness, anonymity and individuality.

The basis for evaluation of standpoints of parents and educators towards environmental upbringing in kindergarten was theoretical construction of goals and tasks in the cognitive and social-emotional field. During the elaboration of evaluation instruments we took into account the questionnaires of Bronstrup and Rossbach (1987), constructed for research of standpoints of parents and educators towards upbringing tasks in kindergarten in Germany, and the evaluation scale for standpoints of parents towards the upbringing of child in family and school by authors L. Okagaki and R. Sternberg (1993). We also took into account the research conducted by K. Špoljar (1986, 1989, 1991) about the standpoints of parents and educators towards the tasks of the kindergarten.

We constructed two questionnaires with a Likert test scale for educators and parents. For each task we constructed several short statements regarding the child, educator and environmental upbringing in kindergarten. For each of the statements the participants indicated their concordance or discord with the statement on a scale of 1 to 4 (1 = do not agree, 2 = do not partially agree, 3 = partially agree, 4 = agree). The questionnaire is constructed from two sections and contains a total of 44 statements. The first section includes 24 statements (cognitive field), the second section includes 20 statements (social-emotional field). The questionnaire was filled out by the parents as well as by the educators. Only results for the cognitive field are presented in the following section.

Research data has been processed by a computer software system SPSS by descriptive statistics, whereas factor analysis of both samples (parents and educators) was also conducted. We also conducted item analysis. Discriminate analysis was also conducted in order to compare samples of educators and parents.

We also analysed the normality of the residuals with a Kolmogovor-Smirnov test, which is normally used for such analysis. Detail analysis of residuals of individual variables was performed with software package descriptive. Emphasis was given on types of residuals. We analyzed symmetry, peaks, variation and cross-section of residuals.

After the analysis of basic statistical parameters, we conducted the analysis of variance based on the following independent variables:age, seniority, education, kindergarten location and age of children. Normality of distribution was tested with asymmetric and peak coefficients. By the factor analysis we defined the number of factors according to the Kaiser-Guttman criteria. Factor number was defined also arbitral.

4 Results and interpretation of results

4.1 Differences between standpoints of parents and educators in assessment of meaning of tasks of environmental upbringing in the cognitive field

We established that there are differences between the standpoints of parents and educators in assessment of meaning of the tasks in the cognitive area of child’s development.

Results show, that parents expect certain results from the environmental education in kindergarten in development of child's speech, especially in the segment of proper expression and pronunciation, where they attribute a major role to the educators. These tasks are less important from the standpoint of the educators; therefore we attribute a minor role to them.

Parents believe that environmental upbringing should emphasise child's expression regarding the environmental problematic (V 5, M = 3,12) and that incorrectly pronounced words should be corrected immediately (V 6, M = 2,97). Parents also believe that the educator has to immediately correct incorrect pronunciation (V 21, M = 3,00). Educators believe that the above mentioned speech aspects are less important in environmental upbringing (M = 2,92, M = 2,49 and M = 2,72).

Educators believe that environmental upbringing in kindergarten should not become just some sort of preparation for environmental upbringing in school, rather it should be a programme where the child has the possibility to meet his own individual development requirements including stimulation of the child's own creativity. Educators concord (V 12, M = 2,33), more than parents (V 12, M = 1,87), with the statement that environmental upbringing in kindergarten should not become just preparation for environmental upbringing in school Parents believe, that the child's imagination should not be limited in environmental upbringing (V 18 M = 3,56). Educators also concord with that statement (M = 3,37).

Parents (V 23, M = 1,75) believe, more than educators (V 23, M = 1,99), that children do not lose contact with reality by listening to the tales and stories during environmental education. Parents also believe that the children in kindergarten can not be asked to problem solve tasks associated with the environment, as the children would be overburdened by such actions (V 24, M = 2,67), while this statement does not appear to be so important to the educators (M = 2,35).

Based on the following results, we conclude that parents associate the tasks of environmental upbringing with speech development and the role of kindergarten in the sense of protection of children and their orientation into the world of adults. Educators also believe that speech development and orientation towards the adult world are important tasks of environmental upbringing, however the level of concordance with these statements is lower for educators, compared with parents. Educators also believe, that its important that the kindergarten does not become just preparation ground for school and an area for protection of children, rather it should become a place where the child's creativity is developed and the developmental requirements of the children are respected.

4.2 Factor analysis

4.2.1 Dimensions of tasks of environmental upbringing in the cognitive field for the sample of parents

Table1: Tasks of environmental upbringing – cognitive field / parents

VAR	FAC1	VAR	FAC2	VAR	FAC3	VAR	FAC4	VAR	FAC5	VAR	FAC6
V6	0,86	V15	0,66	V2	0,76	V20	0,67	V10	0,62	V8	0,66
V21	0,83	V16	0,58	V11	0,65	V18	0,67	V3	0,61	V22	0,62
V5	0,47	V23	0,56	V1	0,64	V13	0,57	V4	0,45	V9	0,51
V7	0,38	V14	0,49	V19	0,28	V17	0,47	V5	0,44	V14	0,40
V8	0,27	V12	0,43	V17	0,26	V4	0,34	V7	0,30	V7	0,34
V10	0,24	V24	0,32	V20	0,26	V24	0,34	V13	0,29	V17	0,21

column 1 variable
column 2 N
column 3 arithmetic mean
column 4 standard deviation

V15	205	2,2732	1,0211
V16	205	2,0634	1,0530
V23	205	1,7512	,9297
V14	205	3,5610	,7749
V12	205	1,8732	,9669
V24	205	2,6683	,9888

V6	205	2,9707	1,0428
V21	205	3,0049	,9827
V5	205	3,1220	,8965
V7	205	3,2488	,8352

	V20	205	3,2585	,7961
	V18	205	3,5561	,7495
	V13	205	3,1415	,9417
	V17	205	3,1707	,8939
	V4	205	3,0000	1,1202

Six factors, which together form 49,12% of total variance, have been identified in the sample of parents in the cognitive field. These are: speech development, proper contents, kindergarten suited to children, preparation for school, development of work abilities and orientation into the adult world.

Factor 1 totals 9,71% of total variance and includes two variables – 6 and 21. In the scope of environmental upbringing it is essential to immediately correct incorrect pronunciation of words (6) and child's incorrect pronunciation (21). Variables are associated with speech development. We designated this factor as speech development.

Factor 2 totals 8,54% of total variance and includes 3 variables – 15, 16 and 23. In the scope of environmental upbringing total freedom of imagination should be allowed (15), environmental contents, which are later studied in school do not need to be studied (16), if the child listens to a lot of stories and tales he loses contact with reality (23). Based on the contents of these statements we designated this factor as proper contents for children.

Factor 5 totals 8,49% of total variance and includes three variables – 2,11 and 1. During the environmental upbringing it its important to protect the children from the effort of adults for environment conservation (2), protect them from complex adult problems related with environment (11) and protect them from existence problems of adults (1). These statements identify kindergarten as a place, where children should feel well and their developmental and other needs will be met. We designated this factor kindergarten suited for children.

Factor 4 totals 8,11% of total variance and includes three variables - 20, 18 and 13. In the scope of environmental upbringing the child can not tolerate long-term burdening (20), his imagination should not be limited (18) and children should not be burdened with success (13). We designated this factor as school preparation, which could be interpreted also as a negation of the very same task.

Factor 5 totals 7,17% of total variance and includes two variable -10 and 3. In the scope of environmental upbringing the child should be capable of focusing for a longer period of time on an individual environmental problem (10); the child should be engaged with one activity for a longer period of time (3). We designated this factor as development of work capabilities.

Factor 6 totals 7,10% of total variance and includes three variables – 8,22 and 10. In the scope of environmental education the children should get to know all the objects used every day (8), children should be accustomed to life with nature (22) and children should be capable of focusing for a longer period of time on an individual environmental problem (10). We designated this factor orientation towards the world of adults.

4.2.2 Dimensions of tasks of environmental upbringing in the cognitive field for the sample of educators

Table 2: Tasks of environmental upbringing – cognitive field / educators

FAC 1	VAR	FAC 2	VAR	FAC 3	VAR	FAC 4	VAR	FAC 5	VAR	FAC 6
0,69	V3	0,74	V6	0,86	V9	0,82	V15	0,71	V18	0,60
0,65	V7	0,65	V21	0,80	V22	0,79	V23	0,64	V4	0,54
0,54	V8	0,64	V5	0,51	V20	0,59	V24	0,50	V1	0,30
0,52	V10	0,57	V11	0,43	V17	0,50	V17	0,43	V13	0,16
0,49	V14	0,52	V1	0,37	V18	0,31	V20	0,31	V22	0,14
0,48	V4	0,44	V2	0,36	V10	0,29	V1	0,29	V5	0,14
0,38	V5	0,39	V7	0,35	V19	0,27	V11	0,20	V11	0,11
0,37	V22	0,20	V10	0,32	V5	0,24	V14	0,18	V9	0,09
0,37	V9	0,19	V8	0,23	V8	0,21	V16	0,16	V24	0,09
0,33	V15	0,19	V24	0,14	V13	0,14	V19	0,14	V17	0,05

V3	164	2,6768	1,0269
V7	164	3,1220	,8564
V8	164	3,3780	,7932
V10	164	3,1829	,8234
V14	164	3,5000	,9168
V4	164	3,0549	1,2096
V5	164	2,9207	,9333

We also identified six factors in the sample of the educators, which total 54,76% of variance: consideration of development needs, development of work abilities speech development, orientation into the adult world, proper contents and creativity.

Factor 1 totals 10,74% of total variance and includes four variables: 12, 13, 2 and 24. Environmental upbringing should not become preparation for environmental upbringing in school (12), children should not be burdened with success (13), and instead they should be protected from the efforts of adults for environment conservation (2). We can not demand problem solving of environmental issues from the kindergarten child, as this would burden him too much (24). All of these variables are indirectly or directly associated with child's development needs and meeting of those needs. Therefore we designated this factor consideration of child's development needs.

Factor 2 totals 10,68% of total variance and includes five variables: 3, 7, 8, 10 and 14. Child in kindergarten should spend more time on one activity (3), prior to departure to school the child should master basic environment concepts (7). In the scope of environmental upbringing the children should get to know all objects in everyday use (8), children should be capable of focusing for a longer period of time on an individual environmental problem (10). In the scope of environmental upbringing, unreal conception of the surrounding world should not be presented to the child (14). All of these variables indirectly or directly show that work capabilities should be developed in the scope of environmental upbringing. We designated this factor development of work capabilities.

Factor 3 totals 10,50% of total variance and includes three variables: 6, 21 and 5. In the scope of environmental upbringing it is essential to immediately correct incorrect pronunciation of words (6) and child's incorrect pronunciation (21). These two variables are dominant. The third variable is: it is important to pay attention to the child's proper expression regarding environmental problematic (5) in the scope of environmental upbringing. The variables define speech development as a task of pre-school institution. We designated this factor as speech development.

Factor 4 totals 10,00% of the total variance and includes four variables: 9, 22, 20 and 17. In the scope of environmental upbringing, the educators have to educate children in such a manner, that the children develop proper relation towards the environment (9). In the scope of environmental education the children have to get accustomed to cohabitation with nature (22), educators have to take into account the fact, that the children do not stand long-term loads (20) and that children can not spend longer periods of time in the sitting position (17). We designated this factor: orientation toward the world of adults.

Factor 5 totals 7,50 of the total variance and includes three variables: 15, 23 and 24. In the scope of environmental education it is undesirable to allow children's imagination to roam freely, since the child can otherwise lose contact with reality (23), because of numerous fictional stories and tales. We can not ask the child to problem solve environmental tasks, since that would burden him too much (24). We designated this factor proper content.

Factor 6 totals 5,35% of total variance and includes two variables: 18 and 4. The two variables are: the child's imagination should not be burdened in the scope of environmental upbringing (18) and the child's speech elements should not be developed separately from specific situations in the environment (4). These two variables confirm that the kindergarten is primarily a place where child's creativity should be encouraged in the sense of holistic approach towards the child. We designated this factor creativity.

5 Summary

We established that its for the most part possible to empirically identify the theoretical construction of tasks of environmental upbringing in kindergarten in the field of cognitive development (speech development, creativity, work capacity, preparation for school and orientation towards the adult world) both in the sample of parents as well as in the sample of educators.

By using factor analysis we analyzed the dimensions of the tasks of environmental upbringing in kindergarten in the cognitive field. Both parents and educators concord that the tasks of environmental upbringing in the cognitive field are: development of speech and work capabilities, selection of appropriate content of environmental upbringing and education and stimulation of the child's orientation towards the adult world. In the social-emotional field both parents and educators have the same view of the following tasks: individual approach to the child, development of cooperation, independence and positive self-image.

In addition to the collective standpoints of parents and educators we also established the differences in standpoints between the two groups which correspond which correspond to understanding of the role of environmental education, consideration of developmental requirements of children, development of creativity, independent conflict solving, self-determination, orientation towards success and subordination to adults.

The established differences in standpoints of parents and educators towards the task of environmental upbringing are often the source incomprehension and/or misunderstanding of these tasks. Given the fact, that the standpoints can change, we believe that the environmental education of educators, which should be regarded as complete lifelong education, is important. We believe that knowledgeable educators can influence the development of self-consciousness and environmental consciousness both in parents and children and by that stimulate the changing of existing, respectively forming of new standpoints towards oneself, others and the environment. The results of the research confirm our thesis, that environmental upbringing is a multidimensional process, which could be regarded as a complete lifelong process.

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ECOLOGICAL EDUCATION IN INTERRELATION WITH EDUCATION FOR SUSTAINABLE DEVELOPMENT

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Globalization and industrial development of the states create fast changes in an environment and opportunity of occurrence of new principles for definition of tasks of a society. Moreover, growth of the extreme climatic phenomena create sharp situation on a global scale.

In the present report the idea develops that in above mentioned circumstances there is a necessity of complete spiritual and physical formation of a human individual for an environment. This can reach by development of complex educational system. In this aspect the special value is received with development of all forms of education in interrelation with ecological thinking of the pupils.

The main global problem is sustainable development, that main part is protection of an environment. The influence of the human factor or anthropogenous influence on an environment becomes the basic part in problem of protection of an environment. Necessity of for education for steady development here is shown, as necessities for modern educational system, is especial in higher education. It is necessary to note, that the education for sustainable development is an educational novelty, which continues the successful introduction in global educational system.

Ecological education and education for sustainable development are in close interrelation. The education for sustainable development not only is closely connected to ecological education, and also occured from it. The bases of education for sustainable development assume reception of fundamental knowledge on natural sciences, understanding for inter disciplinare connections and global processes, modern practical researches with application of new and newest devices and apparatures,

In the present report the attempts of introduction of ecological education in SEUA with close interrelation with education for sustainable development are resulted.

Introduction

Globalization and industrial development of the states create fast changes in an environment and opportunity of occurrence of new principles for definition of tasks of a society. Moreover, growth of the extreme climatic phenomena create sharp situation on a global scale.

In the present paper the idea develops that in above mentioned circumstances there is a necessity of complete spiritual and physical formation of a human individual for an environment. This can reach by development of complex educational system. In this aspect the special value is received with development of all forms of education in interrelation with ecological thinking of the students.

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Here is presented the attempts of introduction of ecological education in SEUA with close interrelation with education for sustainable development are resulted.

In higher schools in Armenia, including The State Engineering University of Armenia, the ecological education of students, permits wide backgrounds. For the introduction of ecological educational discipline in the University the complete spiritual and physical formation of the individual in the environment is taken into consideration : this can be reached by the development of ecological thinking.

The education for sustainable development is an educational innovation. Bringing into existence the education for development in technical institute of higher education SEUA, is based on the fact that engineers play an important role in the realization of purposes of sustainable development. Our previous, nowadays and future specialists are the creators of many human blessing: new productions, new technologies, new goods, new matters and so on, and simultaneously deciding ecological tasks in production as well as in taking measures for the protection of the environment. An excellent example is the success of nanotechnology, which is perfectly introduced into life changing the ideas about technological and ecological abilities of modern production, technology and goods.

Features of a modern educational situation in Armenia

The modern period of development of Armenia (after the collapse of the Soviet system) especially difficultly proceeds in education – the major mechanism social and cultural heritage. The role of education system is defined in a present stage of development of Armenia by the tasks of its transition to democratic and lawful state, to market economy. It will enable to overcome backlog of the country in economic and social development. The purpose of education varies from narrow professionalism education and development of the person. It changes the representation about the forms of university training, about a nature of knowledge, place and role of teachers and another considerably.

One of the important reasons of long crisis in economy on a post the Soviet space is the fall of a level and ability to a competition at a global level of education system. The Soviet educational system had been considered as the best in the world under many factors. At 1960 - 70 years for USSR characteristic became growing demand for higher education. And is not casual, that the students went here not only from the Socialist Countries and Third World, but also from many West countries. It was considered, that the high level of education system was one of few factors, which allowed to be proud to the Soviet system. The level of education system have allowed USSR also to be one of super-countries.

Since 90 years the post-Soviet system of higher education began to reformer the administration and management structure and revised the curricula, accepted the internationally adopted 2 or 3-level model of University education. The difficulties have begun here, as many of institution send by copying by Western, most of all of American system of higher education, instead of the changes have connected from the substantial party of his educational process.

At 1990 some of communist rulers countries was embracing private education. The east European countries with demand for higher education growing began to make buildings and rooms for private universities. Now there is hundred thousands students are learning in private universities, which provide more high level of education and opportunities for realization of educational process, than official bodies.

The post-Soviet system of education also have begun to occur private higher educational institutions in the same time, which are taking place outside of a field of scheduled system of the state. The state began to provide an opportunity of training in state and private educational institutions. It should become the form of realization of principles of market economy in social and spiritual spheres of life of a society.

The European higher education has entered a new wave after of Bolonga`s process. Armenia signed also Bologna`s convention. With this purpose the basis for attraction in this action is created. First in republic on this way became State Engineering University of Armenia (SEUA). Adapting to the past of educational and technological developments, SEUA has revised its curricula and courses toward the internationally recognized standards. Currently it offers Junior Engineer, Bachelor` s Diploma Specialist, Master` s & Research Engineer/ Candidate of Science program in a wide rang of professional areas, preparing not only industry-ready engineers but also qualified professionals in a variety of non-engineering industry-oriented fids as well. It was changed the university structure also, created the Board of Trustees. The real introduction a lot of step structure will supply the integration of the Armenian system of higher education in global system.

Ecological Education
Sustainable development courses

During changes there is a necessity of introduction of subjects, completely new to our higher school, - educational disciplines of the increased level for the purposes of post-graduated education.

Now we shall consider what new educational program such are entered in educational space former USSR, in particular, which are directly connected to democratic trends anywhere and everywhere. Moreover, a major direction program is convergention. Nowadays different higher schools carry out various educational modules and disciplines, specialists under the all-European circuits. It promotes also movement of the teachers and students on Europe, promotes attraction of a labor in the European market of work. In this paper we represent two programs according to our scientific interests.

In a modern society there are all preconditions to promote education of the person. Thus it is necessary to take into account integrity spiritual and physical formation of the individual in a natural environment. For this it can reach by development of ecological thinking. In this aspect the special value is received with development of ecological education. With this purpose in State Engineering University of Armenia general ecological formation education of the students widely takes root. Moreover at university all is done for development of ecological thinking of the students not of humanitarian directions.

The importance of ecological education is marked also Law of Republic Armenia " About ecological education and formation " from November 20, 2001. There it is marked, that the ecological education is continuous process directed to the person with the purpose of its orientation in an environment and nature of use.

The realization of principles of ecological policy and its program purposes requires the wide and organized actions in the field of the education. The similar approach should provide to the nearest future specialists in wide involving in process of product realization, in creative process of making the new goods and the end prosperity in modern life. The modern approach to sustainable development is increasingly multi-faced, with a need to integrate a wide range of elements. It has become people centred with local strategies being developed to meet local problems, for example, as education.

The urgency of ecological-educational programs is caused by a place of chemical manufactures in modern life. Today commodity nomenclature of chemicals consists more than of thousands. Thus many from received target and collateral substances represent danger for industrial personals, for consumers and in generally for environment.

The aim of this program is training the students of the last course in BA level of Chemical technologies and Engineering ecology Department of SEUA. This type of course will ensure and create conditions for perception of scientific and technical achievement by the students not only in narrow local space, but also in wider geographical, global scale. The global scale it is a level of the international community, that is connected to development of the international institutes and documents accepted by them.

The priority of ecological imperative will promote an orientation in a choice of possible directions turning in a major condition socially ecological policy. On the other hand, it is known that if the company or other economical organization invests in knowledge, which increase productivity of investments of the physical or human capital or raises a common level of participation of the businessman, the gain of productivity conducts an achievable due to this to growth of economy as a whole.

The beginning of 21 centuries has shown that the Mankind leaves on a new coil of challenges and uncertainties. The growth of the extreme weather phenomena all over the world precisely testifies. That the change of a climate is not the skeptical forecast and the reality. This call requires resolute measures. The realization of ideas and projects can made at taking into consideration of balance between requirements present and vital prospects of the future. The stability of human development is something greater the continuation of ecological policy by different means. It is strategy of modernization in which to cover huge innovation potential for economy, environment and society.

The students of the Chemical technology and environmental engineering department of SEUA pass some of ecological disciplines: General ecology, Engineering ecology, Microbiology and Microbial growth, Toxicology, Air Pollution and Control, Water quality, Waste water treatment, Solid waste disposal, Monitoring. The students, the future experts in the field of chemical technologies - basic organic synthesis, electrochemical manufactures, manufacture of a glass an silicates, the biotechnology and pharmacy, should be acquaint with the newest ecologically pure technologies, with reorientation on sharp reduction of resources and pollution of an environment. The students should understand that with limiting care it is necessary to carry out industrialization. The criterion of SD is considered such economic attitude to an environment and natural ecosystem that allows keeping them within the limits of economic capacity.

The given course will allow acquainting the future specialists with global problems facing by mankind in the 21-th century. It will present to the students of the tendency of change of an environment on a global scale. Acquaintance with principles of SD will allow the future engineers to take possession of methods of management, scientific, technical and economic levels connected with researches in the field of protection of an environment and feedback, and also with legal-political norms in researched area. A rate propose also acquaintance of the young experts with the circumstance of Republic Armenia before a world public in the field of protection of an environment with organizations of different levels responsible in the sanction of the above mentioned tasks.

The realization of the program on study of a course < Sustainable development> provides with the pedagogical staff having wide experience of activity in social sphere regularly engaged in scientific and pedagogical activity. The lectures of proposed discipline have a scientific degree also.

Effective means for solving the task of SD program has become: science and methods of seminars and conferences, holding discussions, issuing of specialized literature on SD, collections of scientific themes end method developments for ecological, political, economical and low problems. book popularizing science and explaining the surrounding world. For to days of Armenian educational system the most important thing is mass and accessible educational technologies and techniques, able to solve the problem of joining the students to social intellectual potential.

The basic preparation of the program provides with access of each student to library funds and databases. It is necessary to organize the student's visits in special libraries of the foreign representations in RA, firms, factories. The realization of practical employment at the modern enterprises succeeded in realization of the programs of environmental protection is supposed.

There are supposed also acquaintances of students with the practice work of National Assembly and Constitutional Court of RA, with the practice work of government agencies that are responsible for organization and sanction of questions in sphere of Human development and Environmental protection.

The passage of a course should be accompanied by display of the didactic materials - the pictures, tables, video films, clips and others.

Education for sustainable development has two major thrusts.

- Promotion and improvement of Basic Education: The quality of basic education must improve to focus on imparting knowledge, skills, values and perspectives throughout a lifetime that encourage and support citizens to lead sustainable lives.
- Reorienting Existing Education Programs: Rethinking and revising education to include more principles, knowledge, skills, perspectives and values related to sustainability in each of the three realms – social, environmental, and economic – is important to our current and future societies. This should be done in a holistic and interdisciplinary manner. The best chance of success of education for sustainable development lies not in a separate program but in embedding its vision within other initiatives.

A COMPARATIVE STUDY OF TEACHER'S ATTITUDES TOWARDS ENVIRONMENTAL ISSUES

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Problem Analysis: In order to invest into the future in terms of environment, it is vital to identify attitudes of freshmen students towards environmental issues, who are studying at the Near East University, Atatürk Education Faculty consisting of departments of Pre-school teaching, Primary School Teaching, Psychological Consulting and Computing and Education Technologies Teaching.

Aim of the Study: The aim of this study is to understand the attitudes of the students of Faculty of Education in Near East University towards environmental problems. This research is conducted to understand the relationship between the attitudes of students and some demographic variables including their gender, department, income level of their families, birth of places and their current settling places.

Research Method: The sample for the study is drawn from the students of Pre-school teaching, Primary School Teaching, Psychological Consulting and Computing and Education Technologies Teaching. As the measuring instrument the attitude scale developed by Berberoğlu&Tosunoğlu (1995) was used. In analyzing data independent t-tests, variance analysis and LSD testing techniques were used. Results of these test will identify the relationships between the two set of variables defined, namely environmental attitudes and demographic variables.

Results ,Discussion and Suggestions: Understanding the environmental behaviors is vital in succeeding the attempts to shape and influence environmental attitudes. The more positive attitudes of individuals towards environment, more effective the solutions will be towards environmental problems. This study was conducted with the belief that in order to have more sensitive society towards environmental matters, environmental attitudes of individuals should be analyzed. Outcomes of many research has identified that both social and psychological variables of the individual influences their attitudes towards environmental issues. Therefore in order to construct a more positive attitude towards environmental problems, the social and psychological variables that trigger that behavior must be understood.

Key words: Environmental Problems, Attitudes towards Environmental issues, Attitudes of teacher candidates towards environmental issues.

Introduction

A variety of environmental problems affect our entire world. The local environmental problems of countries become international issues as globalization continues and few societies are being left untouched by these problems. Some of the largest environmental problems now affecting the world can be summoned as reduction of energy resources, scarcity of water, deforestation, exhaustion of resources, pollution, rapid population growth, unplanned urbanization and industrialization.

Every environmental problem has causes, numerous effects, and most importantly, a solution. Environmental responsibility and environmental awareness are important issues facing all of us. Over the past twenty years there has been an increase in environmental awareness of societies, and this consciousness towards environmental problems has generated the recognition of the need for environmental education [Gough 2004; Scott 1999, 2000, 2003].

Education is defined as any process, either formal or informal, that shapes the potential of a maturing organism. Informal education results from the constant effect of environment, and its strength in shaping values and habits can not be overestimated. Formal education is a conscious effort by human society to impart the skills and modes of thought considered essential for social functioning [Çağatay, 2006]. The main result of an education is the change taking place in people' behaviors. Through education an individual is encouraged and enabled to develop his or her potential. Education also allow individuals become a productive member of society by equipping them with the necessary knowledge and thus shaping individuals attitude..

Education for environment and sustainable development has influenced educational policies at both national and international levels [Payne, 2006]. Sustainable development is the growth of population, industry, and agriculture in a way that will allow the present generation to meet its own needs without damaging those of future generations. Individuals, teachers, researchers and schools actively construct and give meaning to human - environment interaction and relations [Payne,2006]. Therefore it is important for the education system to contribute to the sustainable development by including a curriculum that teaches students what sustainable development means and to create environmental awareness among students.

Environmental education refers to organized efforts to teach about how natural environments function and, particularly, how human beings can manage their behavior and ecosystems in order to live sustainable. The term is often used to imply education within the school system, from primary to post-secondary. However, it is sometimes used more broadly to include all efforts to educate the public and other audiences, including print materials, websites, media campaigns, etc.

The more a person knows about the environment the more positive the person's attitude will be toward the environment. Researches conducted stated that environmental knowledge is important determining factor of environmental attitudes [Oskamp et al. 1991; Gamba and Oskamp, 1994] and there is a positive correlation between knowledge and attitudes (Ramsey & Rickerson, 1976). Also many studies concluded that an increase in knowledge about the environment is necessary for improving attitudes towards environment. (Arcury1990, Davis 1998 Murdoch 2004)

With the light of these findings, it can be suggested that education is one of the key factors that can be used to enhance a person's knowledge and awareness about environmental matters which then can establish more positive attitudes towards the environment. Therefore the purpose of this research can be defined as to identify attitudes of students towards environmental matters. Furthermore, the research aimed to discover the socio-demographic factors associated with environmental concern. The factors that were measured included gender, age, place of residence, income level and place of birth of the respondents and their families.

Method

The sample for this study was drawn from the freshmen students of Near East University, Faculty of Education. The questionnaires were distributed to the students at the beginning of their class period. The participants were assured that they would remain anonymous. Of the 250 questionnaires distributed, 216 completed questionnaires were returned with a response rate of %86.4.

The instrument used developed by Berberoğlu&Tosunoğlu (1995) was used to measure the environmental attitudes of the students. Some small changes were done on the instrument and re-tested for reliability by Birol&Bekiroğulları&Paralik. The Cronbach Alpha value of the instrument was measured as 0.86. The instrument consisted of 3 parts aiming to measure environmental attitudes of the respondents. Past studies have demonstrated that demographic characteristics may influence environmental attitudes (Dietz et al. [1998]) Therefore, in addition to the research questions, some demographic questions were asked.

The first part of the instrument asked for standard demographic information such as respondents' gender, place of birth, place of residence, parents place of birth and income level of the family. In addition to these, respondents were asked to state their departments within the Faculty of education in order to be able to analyze the suggested difference between environmental attitudes of students from different departments.

Second section consisted of 4 questions aimed to measure respondents general knowledge and attitude towards the environmental matters. Questions include pre-college education about environmental matters, family's sensitivity towards environmental issues, the general attitude towards environmental matters and membership to an environmental organization.

The third part of the questionnaire consisted of 31 questions that measure the level of agreement and disagreement with the statements. Respondents were asked to give their answers on a five-point Likert scale with 1 being "Strongly disagree", 2 being " Disagree", 3 being "Neutral", 4 being "Agree" and 5 being "Strongly agree". The questions intended to determine the general knowledge and attitude towards environmental matters. Questions represented a broad range of knowledge assessed by the survey.

Findings and Comments

There were 216 responding students consisting of 49 (%22.7) male and 167(%77.3) female. All of the respondents were selected from various departments of Atatürk Education Faculty from freshmen year students. %29.6 of respondents were from department of Pre-school education, %20.8 from department of primary school teaching, %28.7 from department of Psychological Consulting and %20.8 from department of Computing and Education technologies.

Table 1: Relationship between Gender and Attitudes toward Environment

		N	X	t	P
Gender	Male	49	3,69	0,635	0,208
	Female	167	3,63		

*p<0,05

Independent t-test has been conducted in order to determine students' attitudes towards environmental matters based on their genders. Mean scores of male and female students' attitudes towards environmental matters were calculated as 3.69 and 3.63 respectively and male students were found to have higher mean scores than female students albeit this difference was not found significant (p=0.208). This result can be interpreted as female students being slightly less sensitive to environmental matters than male students. According to Dietz et al.1998, ideal profile of person concerned about the environment was identified as young women who are highly educated and live in cities. Also level of both environmental concern and pro-environmental behavior were found to be higher in women (Zeleny et al.2000)

Table2: Relationship between Pre-collage environmental education and Environmental attitudes.

		N	X	t	P
Pre-school education	Course taken	44	3,68	0,45	0,931
	Course not taken	172	3,63		

*p<0,05

Independent t-test has been conducted for measuring the relationship between environmental attitudes of students and their pre-collage environmental education. Results have indicated that %25.5 of respondents have had pre-collage environmental education whereas %74.5 have not. The results of data analysis suggested that students who have taken environmental education courses during their high school education has higher mean scores than the students who have not taken any courses, mean scores being 3.68 and 3.63 respectively. Even though this difference is not significant (p=0,931) the suggestion that students with pre-collage education about environment will have more positive attitudes towards environmental matters finds both disapproval and approval in the literature. While many researches has concluded that environmental knowledge is an important determining factor of environmental attitudes [Gamba & Oskamp,1994], some has argued that there is no significant relationship between environmental knowledge and environmental attitude (DeChano,2006).

Table 3: Relationship between Environmental Attitudes and Families sensitivity towards environmental matters

		N	X	t	P
Family	Sensitive	161	3,74	-1,391	0,005*
	Not Sensitive	55	3,60		

*p<0,05

In order to measure the relationship between environmental attitudes and families sensitivity towards environment, students were asked to answer whether their families discuss environmental matters or not. Out of 216 respondents 161 stated that they have talks and discussions within their families whereas 55 respondents stated their families were not sensitive. Results of the t-tests that have been conducted suggests that mean values of students whose families are sensitive towards environmental matters are higher than those whose families are not sensitive with mean values 3.74 and 3.60 respectively, meaning students with sensitive families tend to have more positive attitude towards environment (p=0,005).

Table 4: relationship between environmental Attitudes and students being a member of an environmental Organization

		N	X	t	P
Environmental Organization	is a member	4	3,65	-1,261	0,187
	is not a member	212	3,25		

*p<0,05

Out of 216 students only 4 have stated that they had memberships to an environmental organization. Results of t-tests measuring the relationship between environmental attitudes and membership of respondent to an environmental organization indicated that even though mean scores of students having membership are higher than students with no membership, this difference is not meaningful (p=0.187).

Table 5: Relationship between Environmental Attitudes and Place of Birth

		N	X	t	P
Place of Birth	North Cyprus	132	3,78	4,207	0,000*
	Turkey	83	3,42		

*p<0,05

%62 of respondents answering the questionnaire were from North Cyprus and the rest (%38) from Turkey. Results of the independent t-test indicated that mean scores of students who were born in Turkey was lower than the mean scores of students who were born in North Cyprus and this difference was significant (p=0.000). This significant difference indicates that environmental attitudes of respondents differ according to their places of birth.

Table 6: Relationship between environmental attitudes and Place of Residence.

		N	X	t	P
Place of Residence	Cyprus	144	3,79	5,439	0,000*
	Turkey	72	3,33		

*p<0,05

Independent t-test results point out the significant relationship between place of residence and environmental attitudes (p=0.000). Results have stated that students living in North Cyprus have higher mean scores than students living in Turkey, being 3.79 and 3.33 respectively. This significant relationship is supported by the literature. According to Berenguer, Corraliza and Martin (2005) there is a relationship between place of residence and environmental values, concern and attitudes. In addition to this authors have argued that place of residence is a fundamental social structure that affects the environmental attitudes. Furthermore, other researches have suggested that place of residence is important as the location in which individuals form their values attitudes and environmental behaviors (Brulle 1985,Tanner &Foppa 19996). In the literature, it has also been indicated that environmental concern would be higher in cities then in sub-urban areas (Van Liere &Dunlap 1981) and perceptions of environmental problems increases with the size of place of residence (Samdahl & Robertson 1989). It should be noted that most of the respondents whose place of residence is Turkey, come from sub-urban areas rather than cities, therefore it is meaningful that Cypriot respondents would have higher mean scores.

Table 7: Relationship between Environmental Attitudes and Mothers Place of Birth

		N	X	t	P
Mothers Place of Birth	Cyprus	108	3,78	3,170	0,000*
	Turkey	108	3,51		

*p<0,05

Table 8: Relationship between Environmental Attitudes and Fathers' Place of Birth

		N	X	t	P
Fathers' Place of Birth	Cyprus	111	3,81	4,156	0,000*
	Turkey	105	3,46		

*p<0,05

Independent t-test has been conducted in order to identify the relationship between environmental attitudes and place of birth of respondents' mothers. Results have indicated that respondents whose mothers were born in Cyprus have a higher mean scores than the respondents whose mothers' were born in Turkey, mean scores being 3.78 and 3.51 respectively and this difference was found to be significant (p=0.000). Same results were found when the relationship between environmental attitudes and respondents' fathers' place of birth were analyzed. Respondents whose fathers were born in Cyprus have a higher mean score than those, whose fathers were born in Turkey, mean scores being 3.81 and 3.46 respectively and this difference was found to be significant (p=0.000).

Table 9: Relationship between Environmental Attitudes and Department

Variance	Sum of Squares	Sd	Mean of Squares	F
Between Groups	12,195	3	4,065	
				11,748*
Within Groups	73,356	212	0,346	
Total	85,551	215		

*=P<0.05

Results of One way ANOVA indicated that F value is 11.748 and this value is meaningful (p=0.000). This shows that there is a relationship between students department and their environmental attitudes. In order to determine the difference between groups LSD post-hoc test has been conducted. Results of post-hoc analysis were shown in Table 10.

Table 10. Post-Hoc test Analysis

	Primary School Teaching	Psychological Consulting	Computing and Education Technologies Teaching
Pre-school Teaching	0,152	-0,546*	-0,251*
Primary School Teaching		-0,561*	-0,266*
Psychological Consulting			0,294*

Results of the Post-Hoc Test Analysis indicated that pre-School Teaching department received the highest scores and was identified as the most sensitive towards environment. Following pre-School Teaching came Primary School Teaching Department and Department of Psychological Consulting . Computing and Education Technologies Teaching Department was found to have the lowest scores on Post-Hoc test analysis therefore being the least sensitive towards environmental attitudes.

Table 11: Relationship between Environmental Attitudes and Income level of Family

Variance	Sum of Squares	Sd	Mean of Squares	F
Between Groups	2,143	5	0,429	
				1,806
Within Groups	27,057	114	0,237	
Total	29,200	119		

Results of One way ANOVA indicated that F value is 1.806 and this value was not found meaningful. This shows that there is no relationship between families' income level and their environmental attitudes. The answers given by respondents to the questions in the Environmental Attitude Scale was also analyzed item by item. This analysis was found to be necessary in order to determine and group the items students strongly agree with, agree with, disagree with and items that respondents neither agree nor disagree with. No item was determined that students have strongly disagreed with.

Table 12: Attitudes students strongly agree with

Attitude	Mean
Garbage in Dikmen Area is an environmental problem.	4,55
Ozone layer becoming thinner every day is a threat to all humankind.	4,37
People who throw garbage to the streets should be warned.	4,33
People spitting should be warned.	4,21
Ministry of Environment should be more active in solving environmental problems.	4,22
Families should educate their children about environmental matters.	4,35

It was identified that students strongly agree with the fact that Local garbage problem is a main concern and ozone layer is a threat to all mankind. Also Students strongly agree with the fact that people throwing garbage and spitting should be warned. Finally, they believe that a ministry of environment should be present to actively work for solving environmental problems and also families should educate their children about environmental matters.

Table 13: Attitudes students agree with

Attitude	Mean
Protest meetings should be held against technological products that harm the ozone layer.	3,71
Drinking water coming out of tabs are so distillated that water filters are needed.	4,19
It is not a waste of time trying to rescue Caretta Caretta's in our country.	4,02
Unregistered constructional development is an environmental problem.	3,98
The concept of environmental protection is not something made up by Western Civilizations in order to prevent development of developing countries.	3,41
Being sensitive to environmental problems does not prevent a country from developing.	3,43
The main purpose of environmental groups is to protect environment rather than to form a social surrounding.	3,54
There should be more programs in media related to environment.	3,83
Smoking is an environmental problem.	3,50
Environmental matters are interesting.	3,82
Being an active member of an environmental group is fun.	3,80
Environmental education begins with the family.	4,18
People should be sensitive about environmental matters	4,18
Being an active member of an environmental group is necessary.	3,87
Environmental education courses must be mandatory in high school.	3,90
There must be a Ministry of Environment in every government.	3,66

Most of the items in the Environmental Attitude Scale received an agreement from the responding students. It was recognized that students agree that countries should be sensitive to environmental problems and must have a ministry of environment in their organizational body, water distillation, smoking and illegal constructions are environmental problems and being an active member of an environmental organization and being interested with environmental matters are necessary and actually fun. Furthermore, students agree with the fact that education starts with the family and there should be an environmental education course in the curriculum of high school education.

Table 14: Attitudes students neither agree nor disagree with

Attitudes	Mean
Deforestation /Erosion is an issue in our country.	3,20
Air is an infinite resource.	3,01
Water is an infinite resource.	3,36
Land is an infinite resource.	2,75
UN and other organizations should have a say in how countries will use their natural resources.	3,21

It was realized that students do not really know whether water air and land are infinite sources and if UN and other organizations have a say in environmental matters of other countries.

Table 15: Attitudes students disagree with

Attitude	Mean
People should be influenced to build small living areas within forests in order to satisfy their need for fresh air.	2,74
Every country conducting nuclear tests should be protested.	2,20
Rapid population growth is an environmental problem.	2,29
Starvation in underdeveloped countries is an environmental problem.	2,46

It was identified that students do not believe that starvation and rapid population growth are environmental problems and they don't agree with the statement saying every country running nuclear tests should be protested.

No attitude was found to be strongly disagreed by students.

Discussions

The results of analysis showed that there was no significant relationship between gender and Respondents attitudes toward environmental matters. Even though the literature supports that gender and age is empirically traditional for explaining environmental concern (Dietz et al 1998) and that level of environmental concern and pro environmental behavior are higher in women (Zelezny et al.2000), the results of this study did not support these conclusions. The results indicating male respondents having higher mean scores than female respondents in terms of environmental attitudes may be explained by the fact that cultural characteristics of muslim countries supports males becoming more aware of their surroundings than females.

When the relationship between environmental attitudes and Pre-collage education about environment was measured, it was identified that there was a very small difference between environmental attitudes of respondents who have taken pre-collage education when compared to the ones who have not but this result was not statistically significant. Some of the researches conducted suggest that environmental knowledge is an important determining factor of environmental attitudes (Gamba & Oskamp 1994) whereas some argue that there is no significant relationship between environmental knowledge and attitudes (DeChano 2006). Therefore the result of this test is meaningful, as a difference has been identified between attitudes of students who have had pre-school environmental education and those who have not, but this difference was not significant.

Another relationship identified with this respect was the significant relationship between families sensitiveness to environmental matters and respondents attitudes. This positive relationship finds support in the literature. Researches conclude that there is a positive correlation between knowledge and attitudes [Ramsey &Rickerson, 1976] and as education starts in family, people who have talks and discussions about environmental matters within family will have more knowledge and thus more positive attitude towards environment
Relationship between environmental attitudes of respondents' and their place of birth, place of residence and their parents' place of birth was measured and the results of analysis show that all these variables have a significant effect on environmental attitudes of respondents. Place of residence is seen as a fundamental social structure that shape individuals' attitudes towards environment (Brulle 1985, Tanner &Foppa,1996; Van Liere & Dunlap 1981; Samdahl & Robertson 1989). Also, it was suggested that more attention should be paid to group features and cultural characteristics with respect to environmental attitudes and behaviors (Olli et al 2001, Stern , Dietz&Guagnano 1995) as they influence how people perceive and react to environmental matters. The analysis suggested that respondent who were born and currently living in Cyprus with Cypriot parents have more positive attitudes towards environmental matters. The literaute supports the finding that people living in cities have higher environmental concerns (van Liere &Dunlap 1981) and the perception of environmental problems increases with the size of place of residence (Samdahl &Roberston 1989). Even though Cyprus may seem like a more sub-urban setting compared to Turkey at the first instance, keeping the fact that most of the respondents from Turkey live in more underdeveloped areas. Thus North Cyprus can be considered to be an urban setting whereas Turkey a rural area. The results of the study have indicated that there was no significant relationship between environmental attitudes of respondents and having a membership to an environmental organization. Same this was true for income level of families. Finally, a significant relation between department of study and environmental attitudes was identified, Pre-school Teaching students being the most sensitive followed by primary School Teaching and Psychological Consulting Department students. Students of Computing and Education Technologies Teaching Department were found to be least sensitive to the environmental problems.

Conclusion and Recommendation

Understanding the environmental behaviors is vital in succeeding the attempts to shape and influence environmental attitudes. The more positive attitudes of individuals towards environment, more effective the solutions will be towards environmental problems. This study was conducted with the belief that in order to have more sensitive society towards environmental matters, environmental attitudes of individuals should be analyzed. Outcomes of many research has identified that both social and psychological variables of the individual influences their attitudes towards environmental issues. Therefore in order to construct a more positive attitude towards environmental problems, the social and psychological variables that trigger that behavior must be understood.

Results of this study indicated that place of birth and residence, family's sensitivity, and department of study are all influence environmental attitudes of respondents, whereas membership to an environmental organization, income level of family and pre-school environmental education was not found to be related with the environmental attitudes.
For future research, a more in-depth study of the place of birth variable may be conducted in the future in order to determine the rural and urban differences more clearly.

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EVALUATION OF THE ENVIRONMENT PROTECTION EDUCATION PROJECTS IN THE SPECIALLY PROTECTED AREAS IN TÜRKİYE

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Evaluation of efficiency of "Environment Protection Education" projects, planned to carry out by the Authority for the Protection of Special Areas according to the opinion of inhabitants of this areas.

Two of 14 specially protected areas in Türkiye were selected as working areas. These two areas are Datça-Bozburun Specially Protected Area and Gölbaşı Specially Protected Area. From each determined working area, sufficient number of individuals are selected by snowball sampling and interviewed. The data obtained are coded and grouped and the evaluation results are compared to the aims and targets of the projects.

During the interviews, inhabitants in the both working areas are notified that they do not informed about the environment protection project. Although the demarchs of the inhabited regions in the working areas are pointed out, that they have given seminars on the issue environmental protection by The Authority for the Protection of Special Areas, they are specified that they do not feel themselves well equipped to be adequate in preparing activities concerned maintaining awareness of inhabitants on the environmental protection issue.

In conclusion that the planned projects are not applied properly and the applications are found poorly effective on the inhabitants, they remains to be incompetent and inadequate in creating awarenes concerning environmental protection.

INTRODUCTION

The subject of this study is to evaluate the "Environment Protection Education" Projects that are planned by the State Special Environment Protection Organization to be carried out in the Special Environment Protection Areas of Turkey according to the views of the people who leave in these regions.

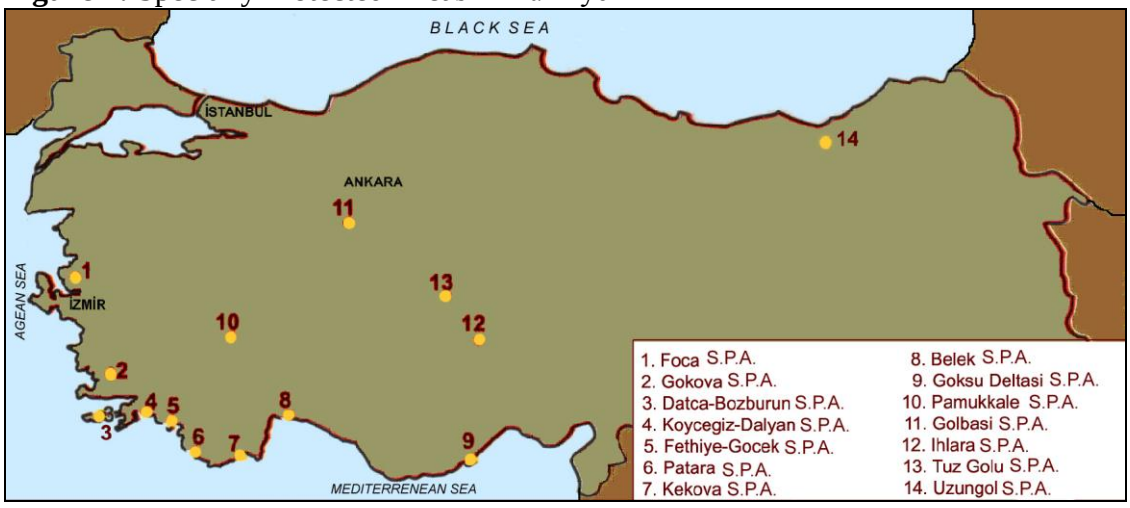
The motivation is to determine the effectiveness of the projects that are realised in "Datça-Bozburun" and "Gölbaşı" regions by means of comparing the application style, season, objectives and the achievements of the projects.

Datça-Bozburun and Gölbaşı have been selected to be taken under investigation among the 14 Specially Protected Areas in Turkey keeping in mind that Datça-Bozburun is situated on the sea cost while Gölbaşı is located on around a lake.

Specially Protected Areas:

Protecting and ensuring the existance of the natural resources has been one of the most critical problems of the humanity in 21st century. The fact that natural resources are consumed and destroyed in contrast to the rapid increase in the population of the world and environmental disasters has forced the countries to seek cooperation to find a solution for this problem (Brisk, 2000; Görmez, 2003). For this reason, means like intenational legal agreements and scientific research have been used to cope with the problems more effectively. With this respect, Turkey has signed many agreements in within the last ten to fifteen years that tend to protect biological variation. For instance, Bern Agreement that aims to protect wild life and habitats in Europe, ensures that kinds that are under the danger to disappaer are protected. This is also the case according to "Barcelona Accord" where it is decided to establish "Specially Protected Areas" in the Mediterranean Region. As a consequence of these developments, the Special Environment Protection Directorate was established in 1989 according to the special law id 383 of the Turkish Parliament. The mission of this organisation is to take care of the Specially Protected Areas selected by the Commitee of Ministers and to take necessary measures to really keep them under protection. The Specially Protected Areas have great ecological, historical, natural, and cultural importance. These areas are determined and advertised by the Commitee of Ministries according to the Environment Law id 2872 paragraf 9 and the protocols related to the protection of the Specially Protected Areas in the Mediterranean Region that are also signed by Turkey. In alignment with this protocol, the fist Specially Protected Areas have been advertised in 1988 and currently there are 14 such areas (ÖÇKK, 1993), (Figure 1).

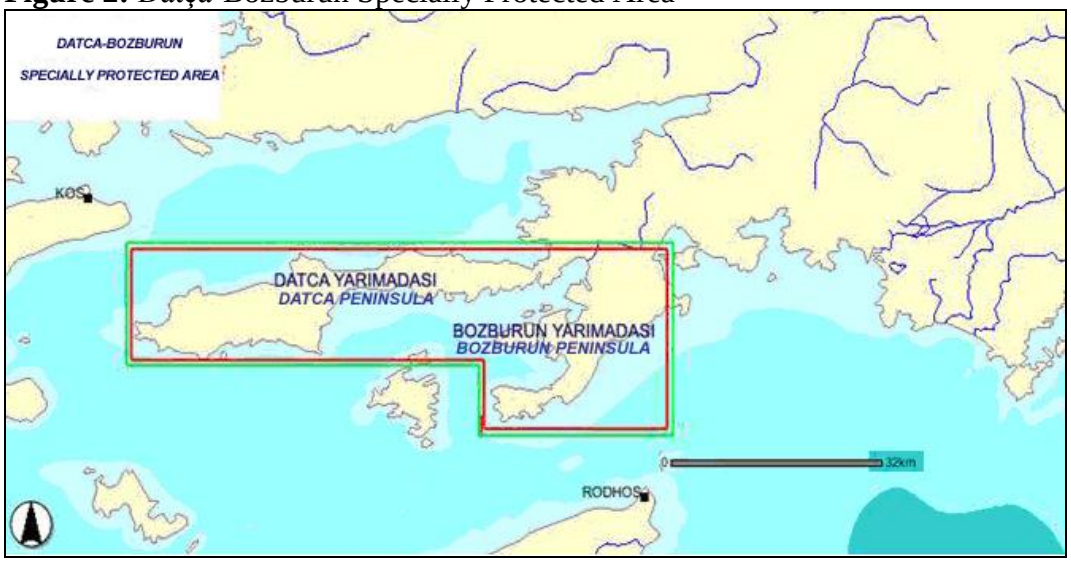
Figure 1: Specially Protected Areas in Türkiye



Datça-Bozburun Specially Protected Area:

One of the Specially Protected Areas is Datça-Bozburun which is selected by the Commitee of Ministers in October 22, 1990 according to the Decision Number 90/1117 (Figure 2). This region is within Muğla province and consists of 2 towns and 17 villages of Datça and Marmaris. It is located between Gökova Gulf in the North and Hisarönü Gulf in the South and extended about 70 kms to the west in the directions of the Mediterranean and Agean Sees (ÖÇKK,1993).

Figure 2: Datça-Bozburun Specially Protected Area



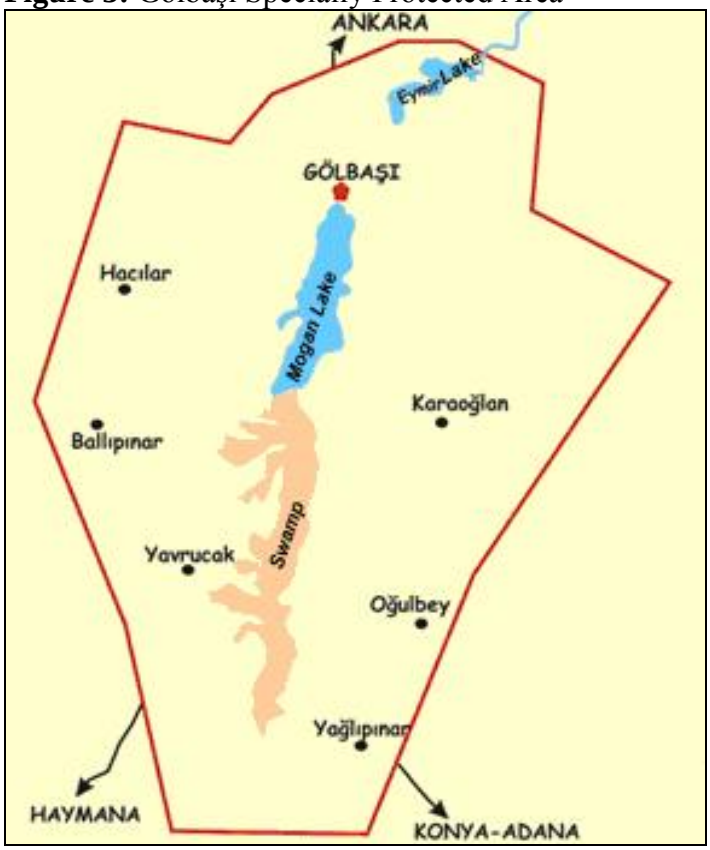
The historical heritage and sits in the region are Loryma, Bybassium, Hydas, Patakis, Soronda, Erine and Knidos. Their ecological importance comes from its sand costs, forests areas (Pinus Brutia, Prunus Amygdalus, Phoenix Theopraxti, Liquidamber Orientalis) and fauna (167 continental invertebrate, 110 fish species, 27 reptile species, 123 bird species ve 45 mammal species) (ÖÇKK, 2006). 35 of the protected species in the Mediterranean Region according to Bern and Barcelona accords were found in Datça-Bozburun Specially Protected Area (Okuş and others, 2004). This region is also suitable to serve the yacht tourism thanks to its wonderful coves and nice weather conditions. The natural structure and the rural habitat has been preserved (ÖÇKK, 2006). Moreover, the region has not been effected negatively by the commercial effects of the tourism industry since it has been dedicated to be a specially protected area early enough before it became a target region for tourism (Doğaner, 1999).

Gölbaşı Specially Protected Area:

The Gölbaşı Specially Protected Area in Ankara consists of 1 small cities and 10 villages (Figure 3). The Mogan-Eymir lakes and their surround areas which are situated about 20 km south of the metropol of Ankara are under the threath of industrial pollution. Beacuse of their ecological and recreational importance, they have been taken under protection according to the decision no 90/1117 of the Commitee of Ministers on October 22, 1990 (ÖÇKK,1993).

The most important parts of Gölbaşı Specially Protected Area are Mogan-Eymir lakes. The area of Mogan lake is about 5 km2 while the area of Eymir lake approximately 1,2 km2. Teir proportion to the total area of Gölbaşı Specially Protected Area which is 971 km2 is obviously quite low. This is the reason why they are under the threath of pollution.

Figure 3: Gölbaşı Specially Protected Area



The rivers that feed Mogan–Eymir form important hydrojeological, hydrological, climatic and biyological watery areas because they provide suitable conditions for uncountable number of animal and plant kinds to live. Mogan-Eymir lakes and the watery areas in their surroundings provide suitable life conditions to 227 different kinds of birds to survive and for this reason makes this region a candidate to "Ramsar". This region also contains kinds like Ardeola ralloides, Ixobrycus minutus, Oxyura leucocephala ve Lesser Kestrel that really need urgent protection.

More kinds of birds like Red-crested Pochard, Pochard, Ferruginous Duck and White-headed Duck that live in the same region are under the danger of disappearing (ÖÇKK, 2006).

The Environment Protection Education Projects in The Specially Protected Areas:
Environmental Education can be defined as to make individuals aware of the importance of protecting their environment, to change their behaviour in this respect in a such a positive way that they take part and responsibility in protecting their their natural, historical and cultural values (http://www.cedgm.gov.tr/cevreatlasi/cevreegitimi.pdf; Aldrich and Benjamin, 1997).

It is essential to teach and inform the people accordingly in order to protect the environmental values of our country (Uzun and Sağlam, 2005). The most effective way to protect environmental values is to make the local people aware of the importance of preserving and improving the conditions of the habitats, plants, animals, watery areas, soil, rivers, lakes, historical & cultural heritage, etc. (Varnacı, 2006). For this purpose, the State Special Environment Protection Organisation has decided on 20.04.1992 and published its decison in the Official State Newspaper number 21205 to arrange and start a project called "Environment Protection Training Program" and since then, this program has been carried out in all 14 Specially Protected Areas in Turkey. The target audience of the Environment Protection Training Program are private and public business employees, teachers, students, hunters, fish hunters, farmers, employees in tourism sector, hausewives, and ship & yatcht owners. The State Special Environment Protection Organisation, local othorities and volunteer organisations came together on June 29, 1994 to sign the Cooporation Protocol for all activities related to environment protection which is a good opportunity to establish coordination with universities, local authorities, volunteer organisations and public organisations (ÖÇKK, 2006). The mission of this establishment is to protect values in the Specially Protected Areas and improve their conditions, to investigate currently existing and potential problems, to determine the problems from geographical, historical, social, economical and estetical point of view, and to improve awareness and sensitivity in the public to avoid and eliminate these problems (State Official Newspaper, 1992).The studies carried on by the foundation since 1991 in Datça-Bozburun and Gölbaşı specially protected regions where it provides study area;

In 1991;

In Datça-Bozburun Special Environment Protection Region, environmental education has been given to civil servants, teachers, students and tourism employees.

In 1993;

In Gölbaşı Special Environment Protection Region, environmental education has been given to civil servants, teachers, students, hunters, local chiefs, farmers, local residents and tourism employees. In these regions, painting, poem and composition contests have been organised.

In 1994;

In Gölbaşı Special Environment Protection Region, environmental protection education has been given to teachers and local residents.

In 1995;

In Datça-Bozburun and Gölbaşı Special Environment Protection Regions, environmental protection education has been given to civil servants, teachers, students, hunters, local chiefs, local residents, ship staff, fishers and tourism employees. In these regions, painting, poem and composition contests have been organised.

In 1997;

In Datça-Bozburun and Gölbaşı Special Environment Protection Regions, a painting contest has been organised with subject of Nature and Environment. In addition, training has been given to students on environment protection. In the overall regions, educational studies have been done on recycling of solid waste.

In 1998, 1999, 2001 and 2002;

In Datça-Bozburun Special Environment Protection Region, knowledge and painting contests with subject of environment have been organised and training has been given to students on environment protection. In the overall regions, educational studies have been done on recycling of solid waste.

In 2003;

To security members who were employeed in 13 Special Environment Protection Regions (police, gendarme and municipal police- 168 people) general environment protection education has been given. In the overall regions, educational studies have been done on recycling of solid waste.

In 2004;

To mayors of 14 Special Environment Protection Regions, general environment protection education has been given

Educational study has been done for local chiefs (44 people) of 14 Special Environment Protection Regions.

Internal education has been given to employees of Special Environment Protection Foundation in Gölbaşı Special Environment Protection Region.

In 2005;

Educational study has been done for technical personnel (37 people) who works for government or private sector waste water treatment plants (ÖÇKK, 2006)

METHODOLOGY

Two of 14 specially protected areas in Türkiye was selected as working areas. These two areas are Datça-Bozburun Specially Protected Area, which is located in southwest Türkiye and Aegean and Mediterranean coast and Gölbaşı Specially Protected Area, which is located in the middle of Anatolia around Mogan-Eymir lakes. After the inhabited settlements in this areas are determined, 8 of 19 settlement areas in Datça-Bozburun and 4 of 10 in Gölbaşı are included in the study.

The documents including details of Environment Protection Education projects are obtained from The Authority for the Protection of Special Areas. The content, goals-targets, applied regions and application periods, applicability, importance, usefulness_of the projects are investigated from this documents. Based on this investigation, a consentient questionnaire form is established. The form consist of open ended questions. The validity of the questions is confirmed by experts. From each determined working area, sufficient number of individuals are selected by snowball sampling and interviewed. The interviews are performed according to the interview form. The obtained data are recorded according to the choice of the interviewed person, by writing during or just after interview or by voice recorder. The data obtained are coded and grouped and the evaluation results are compared to the aims and targets of the projects.

FINDINGS and COMMENTS

In the context of this study, from the settlement locations of Datça-Bozburun Special Environment Protection Region, Hisarönü, Orhaniye, Osmaniye, Selimiye, Söğütköy, Taşlıca, Turgut which are located in Bozburun Peninsula, as well as Mesudiye which is located in Datca Peninsula are selected. In addition, from the settlements of the Gölbaşı Special Environment Protection Region, Hacılar, Ballıpınar, Karaoğlan ve Yavrucak villages are included to this study.

In the study, first of all, how the local people perceive the protected area, as well as the interaction of them with the area are examined. In both settlement locations, the local people, has realized that they are living in a protected area due to the restrictions introduced just after announcement of the special environment protected area. However, they don't know the meaning of the protected area and the reasons for declaring the region as a protected area is still not familiar to them. The biggest problem that the locals of Datça-Bozburun Special Environment Protection Region villages experience is that they are not allowed to enter the forests and to plant bee hives. By this restriction, the most important financial resource of those villages; Beekeeping activities are decreasing and also loosing their importance. The following expressions that we heard very often during the study. is a very important reaction of the locals for being excluded from the protection:

"Forest Rangers don't let us enter the forest. We cannot find place to put our bees. In the past, we used to get wood from the forest, we used to obtain our wood from the old trees without damaging them. We used to collect leaves and sell them. However, now we struggle to make our living. 3 years ago, there was a fire in the forest, I even did not go to help. I don't get any benefit from it, why should I ?!"

In Gölbaşı Special Environment Protection Region, locals express that their utilization from the lake is restricted. The locals that utilize the lake by means of fishing and reed collection in the past, cannot carry out these financial activities nowadays.

Another subject that is examined in this study is the application situation of the Environment Protection Education Project. In the interviews, the concern groups that the environment education program is applied are tried to be determined. It is figured out that interviewed people belonging to profession groups such as farming, beekeeping, fishery are not informed about the project. Regarding this subject, the answers obtained from the locals can be summarized as follows:

"If the special protection council have provided such a training, they would have collected us somewhere to give this training.. Also the village headman would have announce it so that we would have been informed. But it did not happen at all"

With the interviews with the village headmen, they are expressing that a training has been given to them. In 2005, in Trabzon a training is provided to village headmen. However, according to what the village headmen emphasize is that in the trainings mostly zone construction plans are touched. Regarding to sensitive locations of the locations and what kind of studies village headmen can carry out to protect these sensitive locations are not mentioned. Information about coastal and temporary construction regulations are provided in the Datça-Bozburun Special Environment Protection Region to village headmen and also to those owning lands at coasts. On the other hand, in Gölbaşı Special Environment Protection Region, villagemen are informed about water filtering as well as preventing the waste arriving to the lake. In these trainings, villagemen and other concerning parties are not informed about the natural, cultural values of the regions, balancing resource protection-utilization and sustainable resource utilization. Additionally, villagemen stated that the training provided to them was not praxis-oriented. For this reason, they feel difficulties by conveying the information they acquired, by increasing the protection awareness of the locals and they find themselves incompetent for promoting locals cooperating with the protection areas.

Regarding the waste evaluation education provided within the project context; locals understand this application as obligation of using a filtering system in facilities. However, in Datça-Bozburun Special Environment Protection Region, Regular Solid Waste Storage Facility is already built.

CONCLUSION and SUGGESTIONS

Special Environment Protection Council cannot carry on a training procedure as listed in their applied projects list. So far, only village headmen are trained. Farmers, fishermen and beekeepers are not aware of this training. In trainings, not accessing the targeted audiance, prevents bringing up environmental problems from geographic, historic, social, economic, culturel, visual and asthetic aspects which is one of the project target. Additionally, it is removing the applicability of the principle of developing an awareness of the public in environmental protection issues which contributes resolving problems. Provided training is insufficient in creating environment protection awareness. Protection awareness cannot be spread to public in general. Moreover, local people did not comprehend the special environment protected area concept and have not embraced the requirements of living in a protected area.

In order to maintain a sustained development in the specially protected area, the projects planned to be carrying out in these areas should be reorganized immediately and the applications should be compatible with the wish and comments of the inhabitants of the areas and public participations and also collaborations with civil authority and universities is needed. Trainings should be provided for each protection area seperately and instead of providing trainings in a centralized place, they should be carried out directly in place in the sensitive locations of the protected areas with applications.

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CHILDREN EDUCATION : FOUNDATION FOR GREEN FUTURE

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Children are the great lovers of nature and their love can make them the best supporter of the environment. Educating children in connection with various matters of environmental aspects and resulting impacts have had many valuable results in some countries. This article tries to clarify the importance of the ISO supported kids' ISO 14000 programme, "Environmental awareness" among children around the world which will enable them to take practical steps to improve the environment.

Introduction:

Despite all the expressions of environmental goodwill, our planet still seems to be in danger of something under the weight of the negative impacts of industrial activity and the modern lifestyle. The earth is polluted right now and everyday it becomes more polluted. Our lungs are filled with deadly substances and global warming, water pollution and excessive garbage are big challenges. In brief our environment is dangerous and it is steadily growing more so. Many solutions have been offered for protecting the environment and one of them is "educating children and increasing their awareness about the environment with the aim of putting environmental protection in their capable hands.

Twenty percent of the world's population is aged between 10 and 19 and their involvement in environment protection is critical to the long – term success. There is no doubt that what children think and do about the environment today will influence the environment they live in tomorrow. Children play the leading roles and their actions can have a beneficial impact on the environment, their minor individual actions' when repeated on a broad scale can build up to produce major impacts. When consciousness about environment protection is produced in children, it spreads to their school friends, around their families, and later to their own children, thus building up a broad framework of environmental protection support.
The kids' ISO 14000 programme is an international environmental awareness programme aimed at children. Up until this time this programme has been implemented in several countries and has had very positive results.

The kids' ISO 14000 programme's background
This programme was created by *Prof. Takaya Kawabe* the president of the Japanese non profit non governmental organization *ArTech* and *Ms. Miyuki Koyama* the Secretary-General of that organization.

International Organization for Standardization (ISO) aims to support and spread this programme among children around the world because it nurtures autonomous, "environmentally mature" children and young people and helps them to develop a positive attitude and belief in their capacities for protecting their environment.

The kids' ISO 14000 programme is based on the framework of the international standard for environmental management, ISO 14001 which often referred to as the "green standard" sets forth specific requirements for a comprehensive environmental management system, and provides a systematic approach to controlling the environmental aspects of an organization's activities or processes . The operating principle of the ISO 14001 standard is Plan-Do-Check-Act (PDCA) cycle which describes the sequential steps of Plan-Do-Check-Act that are directed at achieving objectives in a gradually more effective and efficient manner. During the Kid's ISO 14000 programme the children learn to use this cycle for establishing environmental baselines, setting targets to reduce negative impacts and monitor implementation of measures to achieve the targets. This programme which compromises four levels: introductory, primary, middle, and highest was launched in Japan in 2000 and is spreading in other countries.

The kids' ISO 14000 programme's results

By participating in the programme , children learn that they can reduce negative environmental impacts and improve environmental performance. This programme stimulate environmental awareness, helps them to use PDCA cycle to monitor and reduce energy and water consumption in their homes and understand the importance of thinking independently, gaining insights, and taking action.

The feedbacks received by participants in the programme are largely very positive. Household environmental awareness increases significantly. Participants lead their families and friends in promoting environmentally considerate behavior in their homes. Participation in this programme helps children come up with ideas on how to conserve energy. The surveys have shown reduction of carbon dioxide emissions by 10 – 15 % per household and increasing environmental awarness among children and their family members by 80 and 60 % respectively. This programme helps children to develop self-confidence, self-esteem and a positive belief in their capacities to make environment greener as much as possible.

Conclusion:

It is evident that the environmental education of children and young people is now one of the keys to the solutions of global environmental problems and for achieving green future. They should learn how to think about their environment, develop un understanding and appreciation of the sound environment. If children think and act in an environmentally – friendly way from an early age, they will always do so throughout their lives.

The kids' ISO 14000 programme is a unique and well structured programme to achieve the aim of living in green future since it offers the possibility of improving the environment in the very broadest sense of the word. Children by participating in the programme learn even simple solutions can make a significant difference in connection with environmental protection. Participating in the programme throughout the world is an important step for adopting nice life styles and consequently achieving green future.

PROCEEDINGS

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SURVEY OF NATURAL RESOURCES IN THE BASIN OF KUFRINJA VALLEY AND INVESTMENT BY USING TECHNIQUE OF REMOTE SENSING

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Data of investment is remotely used to study natural resources in the basin kufrinja valley which is situated between two latitudes 32, 16 and 32, 21 north and two longitudes 35, 36 and 35, 48 easts within (Ajlown) governorate. The study is so important because it sheds the light on what is available of natural resources, how could be invested and what are problem have been resulted. A map has been derived of water resources and water drainage system for the basin soil air-photographs of 1:25000 on 1978 and 1:30000 on 1992 and space visible cannal of satalite (land sat) (TM) on 1992 by supporting of hield investigation. By these maps the researcher can distinguish natural resources and classify when he depended the following classifications to the basin soil, red Mediterranean soil, and yellow Mediterranean soil and brown Mediterranean soil. As well as, he classifies cover plant into oak and pine-tree forests and stabs weeds (Savvannah). Water resources of the basin are divided into surface water and subsoil water that are represented by drainage of spring. The study shows imbalance of water quantities specified for different activities in the basin and its actual requirements where the water deficiency quantity reach in the water that is specified for irrigation of agricultural hardest to 2.766 million / M3 . While the water surplus in the water that is specified for home usage reach to 3.683 millions / M3 .As well as, the study indicated that there is the water surplus of 0.87173 millions / M3 of the quantities of specified water for different uses, and actual requirements of these uses of water. Moreover, the study shows the sides of investment of these resources, and illustrates that the soil is the most investing resources where the agricultural areas reach to 747630 Do. On 1999. Thus, it forms what is rate 67% of the total area of the basin. Contrasted, there is a good soil but unexploded as in the near part, this essentially belongs to the influence of tenacity of slopes in this part. In addition to, the study reveals problems of those natural resources are suffered, especially cover plant, and these problems come from unplanning investment, as far as the absence of scientific and comprehensive administration. The study attempted to present suggestive solutions putting serious conclusions and recommendations.

Introduction:

Water is an essential material in life and wherever you find water you can find life. So, every one are inserted in water since early time and lived near rivers and the greatest civilization as Rafidian Civilization and China civilization in all round the world in past there was no any difficulty to providing the water and to travel from part to another like they do now . for the time being there is problems about water appear clearly for many from reason. First controlling the sources of rivers resulting the scientific development regarding weirs and using them to produce electricity. This leads to the full making uses of water, on the other hand, it will bring harm to other countries which lie on theses rivers just like the situation between Iraq and Turkey. This research consists of three chapters:
Chapter One: it is the theoretical aspect. It includes the boundaries of the area understudy, the problem, hypothesis, justification and previous studies.
Chapter Two : It includes the boundaries of the area under study . The external water which includes Tigris, AI-Kut Weir, weirs and brook and allocating water on it and many of irrigating works.
Chapter Three : The aspects of directing the waster needs in Wasit Governorate;, the decisions of using water to various uses and finally the sediments in Tigris through Wasit boundaries.

Chapter One
Theoretical aspects : The boundaries of the understudy It overcomes Wasit Governorate which lies between 31,27,33, 30 to the North and 44,464 to the east North of Baghdad and Deyala governorates lie and to the south we find Messan and Thi-Qar to the east there is Iran and to the west we have Babil and AI-Qadissia Governorate, Wasit area is about 17123 Km2 which forms 3,05% regarding Iraqi and it contains 13 Administration unit one of the is Al" Kut the center of the Governorate please see in Map No. (1) Area under the study.

The Problem of the Study:
The problem of any study is not answered and we can only put these questions(1)[1] :-
1. What are the resources of water on which the Government depend on ?
2. Is the responsible boards able to allocate water to the various uses in the government ?
3. The quality of the .watering machine in watering the agricultural areas in Wasit ?
4. The importance of the rivers which are lies on the boundaries to the east part of the area under study.
5. The quality of watering and tapping projects in the agricultural areas in Wasit.
6. How can we keep the reduces of water and work to reduce the loss of it in Wasit ?

[1] (1) Latif, Hashem, Re- distribution in Wasit , a thesis submitted to the council of the college of the Educational , University of Basrah , 1989 ,P.31 .

The Hypothesis of the Study :

Depending on the question which represent the problem of the study , we can imagine the requires of the study as :

1. The most important resources of water in Wasit is Tigris and al-Jabab and Badra in proving the resources of water.
2. The accuracy and quality of allocating waster allover the governmental.
3. It was proved through some statistics that reducing the loss of water is because of the largely use of machinery watering in this Governorate.
4. Wasit is regarded as the largest in the country concerning the agriculture areas and production.

The Justifications of the Study It is represented in the absence detailed scientific studies concerning this subject regarding Wasit and it concentrate on water resources especially the less of water because of the large number of Weirs that were built by Iran.So, we present this study in order to handle this water less depending on scientific and modern means in various aspects of agriculture and using the technique for large areas in Wasit and programming .The government is in need to this study in order to decide how to serve people in the social and economic aspects by reducing loss of water in Wasit and all over the country. Wasit became more remains at the end of the eleven century but while the old city was dying out (1) [2] , a new city formed on the other sides of the river and it replaced the old one and grew to be the centre of (Lewaa)(2)[3].The new village was a collection of houses built from clay , it became larger and they called it AI-Kut) which had an important role regarding roads and resources of water made her the first in area and production (3)[4]

Climate :

Climate is regarded as one of the natural things that influenced human beings and also plants and animals. It plays a vital role in agricultural moment on which farmers depend. Wasit climate is similar to that allover the country high temperature, the low of wetness and the sum of sun ways (4)[5].

As result, the government situate under desert weather which overcomes nearly the Middle and the southern parts of Iraq.

Table No. (1)

Months	Temperature	Maximum temperature	Monthly temperature	Rain average
January	4.5	16.5	10.6	28.5
February	6.8	20.1	13.1	23.2
March	12.2	- 23.9	17.5	28.1
April	16.9	29.5	24.9	16.5
May	26.2	38.1	30.1	7
June	28.1	43.5	34.3	-
July	32.3	45.1	35.6	-

[2](1) Ahmed Sosa , The history of wady AL- Rafidian , part 1 , freedman house of press , Baghdad , 1983,P. 212.
[3] (2) Same source , P. 207 .
[4] (3) Adial AL-Bakry , The history of AL-KUT , AL- Aany printer , Baghdad , 1967 . P.85 .
[5] (4) AL-Salash , ALI ,The climate of Iraq , Amman , The CO , operatire printing press workers secity amman-Gordan,1982.P.10.

Table I Cont.

August	29.5	45.8	34.4	-
September	25.7	41.9	32.1	-
October	17.8	33.3	24.8	10.9
November	11.3	25.4	18.7	22.3
December	5.9	17.8	11.2	25.4
			23.3	162.5

Sources : WMO In Iraq, Department of Climate, data not regional, 2000

Heat:

It's of the most important elements of climate because it is responsible about the changes that happen and effect other climate elements. For the influence on the some of rain and the increase in the loss resulting from evaporating and decide the quantity of water in rivers through evaporating process which is effected by other things like the number of the day's hours(1) [6] the speed of wind, the surface on which evaporating happens.

Depending on previous statistics kit is Claire shown that heat is excessive in Wasit, or example (June, July, August) Are the hottest months of the year

Reins:

Rains is considered as the main resources which provides and it's props especially (AI-Jabab) in addition to providing (Kalal Badra and Kalal Tarsak), the area under study with water on which rain's features depend regarding to quantity, repeating all the place and time of allocating (1)[7].Rain in Wasit is few, different from season to another and deference of quantity (Map No. 2)During the months (June, July, August, October) there is no rain in most south or med. cities in Iraq. So agriculture area don't depend on rain , some place which are closed to Iran benefit from the descend coming from mountains like (Shek Saad, Badra and AI-Shahabi (2)[8] .

External Water

Tigris the main recourse of water in Wasit on which all the Governorate depend in watering. It enters Wasit from north until the south eastern spots. Tigris is about 327 Km controlled with flood obstructions which was higher than the flood level in 1988.

Deyala river receives large sums of water and Samara and Kut Weirs control the currency of water depending on Wasit and Thi-Qar (AI-Garaf Gulf) and Messan and this make the boads of watering in Wasit responsible of studying the three Governorate needs of water. Natural elements effect Hydrology situation of the river as well as climates.

The length of the river and it's width effect ways of the river . We find many turnings between Baghdad and AI-Kut. The problem of sediments produce a large number of little isles which are shown clearly during the pennon of dray and this surety influence movement in the river. When the rivers meets Deyala it's slope average is (6v5 Cm.) in Km. And it's width is about (250 - 350) and there are many measures on the river.

[6] (1) ALI , AL-WAILY , The role of climate in basin of Tigris river in Diala-Baghdad-Wasit, Thesis submitted to the council of Educational , University for PhD, 1997,p.27.

[7] (2) 1) Talal Maruash, basin ofGebab river, a thesis submitted to the council of the College of Educational, University of Baghdad for master degree , 1992 . P. 182

[8] (2) Latif Hashem, Redistribution in Wasit. same resource , P. 84.

The first one at the meeting of Deyala , the second in Salman Bake and Azozua . the third one in the front part of AI-Kut Dam .
Tigris depth is nearly 7,25 M. and the average of speed after the dam is 65 M3 S., It's depth become (8,5).

The draining of Tigris is different from a year to another regarding climate conditions and the quality of waster which reached . The level of darning in AI-Kut station becomes less because of the largely making use of its water in watering the areas on the two sides of it in addition to two other causes evaporating and soaking into the earth. Regarding the conditions Iraq passed through during Winter of the year 1999 which witnessed scanty of water because of the little falling quantity of rain and snow which led to reducing the level of Tigris tell it reached 800 M3/S.

On the front part of the dam the level is (18,0) according to it (11,60) but the scanty led to the reducing of the river levels. For example in Suwayra it became 21,10 and speed of draining was 273 M3/s until it became 100 M3/s which meant that draining of Tigris is 47% and AI-Graf is about 50%.In spite of all this, the boards in Wasit were able to control allocating water in 536 thousands donums and without a lot of damage especially strategically in addition to some other agricultural production out of the plans.Map No. 3 shows the river which are branches of Tigris through Wasit. Concentrating was on the reclaimed lands and avoiding the rest.Regarding sediments in Tigris is different from place to another and most of them of loam The sediment was about 20,000 M3 in the front part of AI-Kut dam and Tigris level here is higher than AI-Garaf, therefore , many canals were rigged towards AI-Garaf like AI-Garaf, AI-Butera and Al-Dejela along 55 Km. To the south of AI-Kut dam . To the left bank, AI-Jabab prop, meets Tigris .Which comes from the east along 87 Km. And increasing of AI-Emsandak to the right bank to transfer the increasing of water to the law parts like AI-Sineya marsh map No.4 Tigris during passing through Wasit Governorate .

AI-Kut Dam
.It lies on Tigris at AI-Kut city . Work started in 1933 until 1939, the main purpose was allocating the water between Tigris and Euphrates and it was similar to the design of (Najaa Hamadi) dam in Egypt. It has 56 gates of 60 M. capacity and 80 m. long. The length of the earthy part of it is about 97v5 m towards the river and through it there are 6 times of bases made of steal in the bottom of the river to 10,2m depth. The largest part is the supporters which is about 4,2 m .The capacity of graining in it's highest levels is 7740 M3 S. and the highest level which was 18,98 m up the level of sea happened in 1941. One meter was added on the dam in order to water the land in AI-Husseinya-Ahowrand AI-Mazak project in 1966.
AI-Kut dam is one of the most important dam in the country and it is a clear prove to the interesting in agriculture aspects and development in Iraq and organizing water allocating and watering all the lands on the two sides of Tigris and it was helpful to enlarge al-Kut city and make it a good place for touring in addition to that it will protect creatures in Tigris Weirs, brooks ,'organizers and squirt station .

Wasit suffers from frequent floods bear of Tigris passing through along 327 Km. Tigris is a natural river and it's separated and the controlling of AI-Suairaa watering office about 88 to the right side while the left side under controlling of AI-Hafriea of about 48 Km. AI-Zubydiya office controls 65 Km to the right while I Al-Azizya office controls the left part of about 87 Km. Al-Numaniya office , to the right controls 50 Km and 40 Km on the left.

The board of Al-Dalmoj project controls 45 Km. on the right while the office of Kut controls 45 Km to the right and 110 Km to the left. At last, Shaikh Sa'ad office controls 45 Km. on the right and 43 Km to the left. (Table 2).
All these hindrances are opened of about 300 space to form Sghirt stations at the front of AI-Kut dam which cause a large danger during the rising of water level.
Brooks forms abig number of watering vets in addition to the brooks of the boundaries.

Table No. (2)(1)showed along hindrances of Tigris river according to branch and project of Wasit Governorate[9]

Name of Branch & project	Tall of hindrances Km	Name of Branch & project	Tall of hindrances Km
A-South side 1-AI-Swira Irrigation Branch 2-AI-Zubidia Irrigation Branch 3-AI-Numania IrrigationBranch 4-Adlmach Irrigation Branch 5-Kut Irrigation Branch 6-Shikh sa'ad Irrigation Branch	 88 65 50 45 45 Total—— 338	B- Left side 1-AI-HafriaAdministration Project 2-AI-Azizia Irrigation Branch 3-AL-Numania Irrigation Branch 4-Kut Irrigation Branch 5-Shikh sa'ad Irrigation Branch	 48 87 30 110 43 Total—— 318

These figures was get it from Directorate of Irrigation -Wasit Dept. of Wasit , not published 1999

Organizers is the most important building which bases on watering nets and allocating water. There are about 4000 main organizers and this large number needs a true interest to repair and running them and there are five groups in (Al-Hafriya, Kusaiba, Shahsiymeya, Dalmaj, AI-Dejail and Al-Dubony) in addition to the agricultural offices. The working organizer in 1999 (578) big (1235) allocating (335) cutters.

There are two types of general squirt station the first type is used for watering t he landed that needs water provided with machines.

The second type is used for tapping in order to remove salts and water table.AI-Ghraf Guild. It is a branch starts from the front part of AI-Kut Dam and it lies at the front of AI-Garaf organizers and it goes toward the south east between Tigris and Euphrates from Kut until AI-Nasserria town and it passed AI-Muafakiya of about 15 Km then it passes by AI-Hai town of about 48 Km and after 25 Km it passes through AI-Nasseria lend and the total of it's length is of about 168, 88 Km. Of them is inside Wasit.

AL-Ghraph Golf Apposite

It content of four apposite on AI-Ghraph Golf the first one is placed n front of AI-Hay city and other three are placed south of it about 25 kilometer the distance between each other the fourth is placed 8 kilometer south AI-Rufai City.

[9](1) irrigation register in Wasit , reference from Directorate of Wast Governorate - the information is not published , 1997.

The purpose of establish these apposite is to Irrigation the area through it's water and in same time to increase AI-Ghraph water to an able to transfer the water to neighbor land and it take in consideration the heavy agriculture in designing the apposite the higher drain which can • passed from first apposite reached about (450)M3 in Second and the range of drain for the second apposite is about 350 M3 in second and for the third apposite 300 M3 in second and for the fourth apposite(250) M3 in the second and for the information the first apposite is placed in Wasit Governorate and the first apposite is content five open doors have radius each width 9 meter , highest 60 meter and it is not for sail it's width 8 meter and it's highest 8/50 meter it's tall 70 meter.

Also they made other apposite in left side and in front of the first branch to control the water when the transfer to Al- Ghraph project and it will be possible to press higher stage some of 150 M3 in second through this system.
The second apposite will be from four doors half of radius it moves n width 9 M and high 5-9 M and a part for sailing width (8)(1)[10] and for M-Ghraph Gulf it reach to 90 M3 in second the became to 100 M3 in 3 second(2)[11]. Using water from AI-Ghraph it reach in April to 450 M3 in second it reach 180 M3 to AI-Badaa apposite .The highest drain in he years of overflowing was reached to 622 M^3 in second (3)[12] and there is many brooks came from AI-Gharph Gulf or branch of different drain and most of these river are in AI-Hay land and you can see that in map No 5 .

The land reached in Wasit Governorate 877877 Donum. ,125000 Donum are irrigation by AI-Hay Janabia which has two branch from the left side AI-Kharph Gulf as mentioned which it's tall 14 Km and it's drain about 25,0 M3 s in second and it has nine branch and it is in different drain and those lands don not irrigation by water flow only but by press also electric pressure and by Diesel also . it is number it reach to 650 press with different horse power force which is distributed in to branch (AI-Hay and Albashair and this shall help when the water i? decrease , and all the lands which irrigated by AI-Khraph river are unfixed land (4)[13]the following brook(3) , (4) , (5) show the name of brook which came from AI-Khraph Gulf in different drain for each brook and through Table No. (3) which the general useful brooks at the AI-Mowfakia which are the branch of AI-Khraph Gulf, which were highest drain in those brooks is called Merdzejia which reach to 36,0 M3 in second which Saturday and four days for Dhi Kar Governorate started Sunday morning up to Thursday morning and the share as follow(1)[14] .Waist (20) M^3S for three days which was engaged in No. 2,1 on Arab Gulf to insure the working brook which belong to AI-HayIrrigation and AI-BashairAnd branch of AI-Mofakia Irrigation(2)[15] .Irrigation project and water usage in Wasit Governorate Project According to Decrease water income for land Agriculture in project which has fixed, it was charges which request was limit according to plan decided for each

[10](1) Same reference 1983P. (354)
[11](2) Ministry of Irrigation- Directorate of Irrigation -Wasit Governorate - Yearly report concern the irrigation project , in Wasit Governorate - prepared by Engineer Mahdi Khzam Khsheem
[12](3) Dr. Mahdi AI-Sahaf • Wafeek AI-Khashab p. 365
[13](4) Main Register of Irrigation Directorate (Wasit Governorate) The information is not published in year of 1999

[14](1) Directorate of Irrigation - Wasit Governorate - Dep. Of Planning - the information is not published. 2000
[15](2) Directorate of Irrigation Wasit Governorate ,Water usage, Irrigation Project Relation with Agriculture Production in Wasit Governorate - the report printed in 2000.

waster project and to insure their work to insure the electric power for the project to success the1) Directorate of Irrigation In Wasit Governorate office of Dams , the information is not published 2000 .2.Agriculture plant and to treat the out of work case in presses and to supply new presses for some project according to memorization terms and to follow by directorate to limit these drainage and be note that AI-Dalmaj Irrigation project is effect it's drainage some days because of Tigris low water near to AI-Kut Dam up to (17,3) and for this result of drainage in project must use the water as limit and not to cause complete law in water.

1. AI-Sewaira Irrigation Project:

The AI-Hafria project placed in Wasit Governorate -AI-Hafria village south of Baghdad city about 5,0 Km. And on left side of river Tigris(1)[16].The Ommonification land of this area is about 114 donum which is ready for agriculture and irrigated through three station on river Tigris and the total drain is (19,5) M3 S and it tapping this land through two station of press and total drain is (8,5) M3 S. and because of easily effect and without any objection for agriculture plane , the project was divide in four stages and with limit drain according to exist request and follow for all production which mentioned in plan.

1. Rabedha (3,8 - 3,-) M3 S. it lands of first stage equal about 5100 donum.
2. AI-Zakdtdda (9-5v69), M3 S. it is second stage land which equal about 28800 donum.
3. Alkhajeea (25,7-11,40) M3S. it third stage land which equal about 500018 donum and the fourth stage which is about 30000thousand donum and total drain were 39,5 -20,36) M3 S. and the drain of parity station as follow :-

A. South drainage station (2,5 M S.-600 liters/S).
B. Salatta drainage station (6,5 M/S. -900 liters /S)(2)[17]

2. AI-Shhmia & Ksseba Irrigation Project

This lands are placed in south side of Tigris river inWasit Governorate -Sawera town and it's area land which are fixed for the project for both Al-shhmia & Ksseba (93,500) Donum and the land irrigation (107,500) donum and there are some area did not complete the fixing yet and the work is stopped . And the irrigation the project is from Tigris river through it's Al-Shhmia two station (13) M3 S and Kssebia (10)M3S,and tapping their lands through tapping station which their drain about (7,43) M3 [s(3)18]. And because of less in main irrigation from Tigris river and drain was limited for AI-Shhmia project do to production request which is mentioned in the plan as it was highest drain for the AI-Shhmia project (13)M3S.and lowest drain reached to (6,89) M3 S. Also the same in Alksseba project the highest was (10) M3 S. and the lowest drain (4)M3S. This was concern the irrigation project and for drain tapping station was reached in AI-Shhmia about (3,14) M3 S. also AI-Ksseba station press (2,86) M3 S (4)[19] . The work was done to checking the drain in both irrigation branch by Directorate and project administration to limit the drain designing and not to pass to other water cannel for the purpose according to system which is done in the project of 'AI-Ashaki irrigation.

[16] (1) Directorate of Wasit Governorate - Water usage Department - not published .
[17] (2) The communification project in Iraq - prepared by chief engineer Maida Jassm Mohammed / Technical affairs K and Chief engineer Sabih Yahya Saleem- Chief Department, 1992.
[18] (3)) Directorate of Wasit Governorate - Water usage Department - not published
[19] (4) The ommonification project in Iraq , same reference in page 187 .

3.AI-Daboni Irrigation Project/Alioot Agriculture

The project placed between the Agriculture area in Wasit Governorate in general street between Kut - Baghdad in distance of 60 Km. North of Kut city and in distance from Baghdad , the area equal 3150 donum are Agriculture in four project stage (1)[20] and irrigation by main press irrigation in Tigris river1 to drainage 16M3 toAI-Shoeeja down wells the tall reached in main irrigation cannel 22,540 Km. And the second cannel about 27,500 Km3 (2)[21] and after water loose in Water resource the drainage was limited according to exist request for different crop which are mentioned agriculture plan for main irrigation station , the highest drainage was 16 M3 and lowest drainage was 3,25 M3 (3)[22].

4.AI-Daboni Irrigation Project (Badra - Jassan)

This project placed in Al-azezia town in Wasit Governorate and this project is the main assistant for drink water for Badra and Zourbatia and close village in this area additional to main project is to irrigation the agriculture land which are useful of project establish as the main area for the project is about 75 thousand donum 50 thousand donum are placed in Badra town and 25 thousand donum in Al-daboni agriculture in Al-zzezia addition to big area of orchards which irrigation from the project because of the different of range at Tigris river and other area which used the project water , there is press station in different places spots in Tigris river, their Nos. are four press station with drainage of 30 M3 the following explanation for many canals and cannel drainage and its surfaces and tall of each canal.

1. CanalJl

Abdomen canal tall 3.9 Km. and it is drainage 1,3M3 and it support from 4th. press station for irrigation 50 thousand donum of agriculture lands it's surface 480 donum of Jassan orchard including the association of (al-syab, Alshahil, Al-bastana and drainage which is used now is 5,2 M per second with average (2) pressure in Winter and using one pressure in Summer it drainage (2,6)M3/S and following canals are it's branch :

2. Canal JI/D2

It is interior canal it's tall 3 Km. drainage 866 liter/S from apposite top main canal and in the end it flow in old Sleman which is not abdomen then it branch for one Km. from canal abdomen J1/D2AI-Mazraa canal it is unabdomen with a drainage of 88 liter/S 4-Canal Jll.Abdomen canal it tall I 3,,65 Km and it drainage design 1,9 M3/S and in end of canal it divided in two canals.:

1. Canal JI4,4-9 un abdomen it is tall 3 Km and drain design (150) liter/S and it contain 418 of orchard it's surface 3500 agriculture lands .
2. J14/3 unabdomen canal called AI-Khasil river l'stall4Km and it's drainage 4 liter/ S. there is 48 liter the area is about 1200donum Agriculture lands.
3. J14/5 unabdomen canal it called Abo Sharef river tall 3 Km it's drainage 44 liter there is about 1950 donum agriculture lands.
4. J14 unabodomen canal it called Sofi river it's tall 3 Km drainage 44 liter/S it's surface 1627 donum Agriculture lands

[20] (1) The ommonification project in Iraq , same reference in page 228 .
[21] (2) Directorate of Irrigation - Wasit Governorate - Dep. Of Planning - the information is not published. 2000 .
[22] (3) Directorate of Wasit Governorate - Water usage Department - not published .

5. J14/2 unabdomen canal it called Jaj Shmkhi river it's tall 4Km. it's surface 2105 donum Agriculture lands (1)[23]. AI-Dlmch Project:This project is north & western to Kut city on distance of 30 Km. in front of AI-Kut dam the project surface for the three stage Lhowar 70940 Donum (2)[24]

5.AI-Damlaqe Project:

It placed south west AI-Cut city 30 Km. Away from Kut dam it surface for the stages / Hoar (70940) Donum , AI-Husania 100950 donum and AI-Muzak 65644 donum including uommonification land and unommonifiction land and it irrigation by three main brooks the origin of there water is from Tigris river (1) the drainage design :- (Howar 14.6 M3 /S. by press AI-Husinia 22,65 M3/S flow water AI-Muzak 8v75 M3 flow water). But it can't get or to insure continue this drainage because the low water during Summer season in 1999 in the law grade(17,50) this was the reason of stooping the station and in same time law drainage in AI-Hussinia & AI-Muzak and for this reason the drainage became very poor and the main drainage called as follow :- (Howar main drainage 3 M3/S.-400 liter/s. AI-Husinia main drainage 4 M3/S. - 500 Liter /S AI-Muzak main drainage 1,5 M3/S -300 liter/S (3)[25]. As shown in map No. (t) AI-Dlmach drainage project in it's three stage)

6-AI-Dujila Irrigation Project

This project is placed between the two rivers Tigris and front of AI-Kut dam and it's tall about 36 Km (4)[26]. and from this project there is 14 branch in different tall and drainage and it's surface is about 76 thousand donum complete ommonification lands and these lands irrigated by that brook or canal it's drainage is 42 M3/S and there is four main apposite also there is 21 canal main and branch with different drainage. Each of surface irrigated and the tallest main canal is 40 Km. And other field canal is about 190 Km (1)[27] .

.There is three station for drainage as follow:

1. Shkha Press station /8 it's drainage 7,5 M3 S.
2. Shkha press station /11 it's drainage 4,5 M3.S.
3. Shkha press station/13 it's drainage 11 M3.S.AI-Hajma drainage 471 Km.

AI-Halqia 2699 Km(2)[28] It is possible to show the projectin map No. (7). The Surface Brook Irrigation :The brooks No. with general useful in Kut Center (7) these brooks are in different taller and with different drainage as the total drainage is about 90,5 M3 S. and the most important brook is Al-sooada, Alfatar and AI-Jihad which irrigate the lands around and in Qadisia Governorate and the water came from front of Kut Dam as the range of drainage is about 7.5 M3 S. and Sooada 4 M3 S. & AI-Jihad 50 M3.S. including 2 M3. S. to Wast dovernorate and the remain to Qadisia Governorate through cataract which placed 54 Km in project the total surface is 361,887 (3)[29] donum as shown in table No (8) .

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[23] (1) This information have got it from Directorate of Wast Govemorate Irrigation -department of water using-origin register-the information is not published for the year 1999.

[24] (2) Majid AI-Said Wali Mohammed - same reference P. 28.

[25](3) Directorate of Irrigation - Governorate of Wasit - the information is not published 1999.

[26] (4) . Majid Alsaid Wali Mohammed same reference P. 30

[27] (1) Same reference -The relation of Irrigation project for the agriculture in Wasit Governorate .

[28] (2) Ommonification project in Iraq , same reference , P. 30.

[29] (3) The reference , Irrigation Directorate . Wasit Governorate , Branch Kut Irrigation - the information are not published , 2000.

Water Request for supply for houses (human) in Wasit

Governorate and there is different in range using in between each person from city housing and in same time there is different between the city and village and we can say 89% from city peoples they use pure water but the remain they use water not pure (4)[30] and the medium for each one from the city pupil using water for drinking and other house duty is about 212 liter in the year 1990 then reached to 262 liter in the year 1995 , and shall be twice this quantity in year 2010 . And for village people they have ;make range for the water 110 liter for Agriculture per day to 24 liter per day for drinking and other house duty , 56 liter for animals and 30 liter pier day for general requests . And to be sure in account request for the water for the people, we have information concert No. of at village and modern for Wasit governorate as their people are (786,150) in depend of general notes for the people in the 1977-1978 to know the average of people groth and their water request for housing then we find the years growth for the people as:- R= range of I housing growth , Pt. = the No. of housing in last No. , Po = the number of housing in first No. t= No. of the years between the two No the account has been done according to :Pn = po (I - r) .

Flow brook in Kut center:

Total No. of brook which are general useful in Kut center are (7) brooks in different taller with drainage different each other and the total of those drainage of river 90,5 M3 S. and the most important in those brooks Al-sodaa ; Al-battar and Gejhad who irrigated lands including ^surface of Governorate of AI-Qadisia which take their water from front of Kut dam and the drainagae reach to 7.5 M3 S. , Sodaa 4 M3 and Gejhad 50 M3 S., 2 M to Wasit Governorate and the remain to Qadisia Government through cataract which pllaced in Km. 54 over the project and the surface is about 361,887 donum as showed in Table No. (6).

Table No. 6 General Useful Brook at Kut Center

No	Project name	Tall Km.	Drainage	Surface in donum
1	AI-Bataar	20	7	54887
2	AI-Sodaa	21	4	24000
3	AI-Rhma	15	150	10000
4	Absrokeea	17	7v50	23000
5	Wedaa	14	1v25	10000
6	Al-sheeb	20	4	25000
7	AI-Jehad	115 90,5 M3 S.31	50	215000 Kut

[30] (4)) Ali Khiilb abdul Khalik - water resources in Iraq and it's effect on Iraqi economyAs pn = No. of housing accepted for the year, po = No. of housing in end of numerous , n = No. of year which is separate for the last numeration for future year r= average of growth yearly between the last numbers as this dependent on United Nation

Depress

1. AI-Shoeeia Depress and stores

The hour Alshweja placed in north east of Kut city and in some years the water came to Tigris river through Hour Alshweja because of heavy rain which filed its water on the Iran mountain then it calculated to this hour then to river through Kasra road which placed on35 Km sour of Kut which tahey established the apposite to drainage the water to river as the water come from Iran's mountain to river Tigis south of Kut through the road river AI-Jabab flow in river 40 Km distance from Kut city(1)[31] . The resource which came from the rain 125 miller M 3 on the account of rain drop in law feeding 100 mm. Inper day as highest range according what came in registration of Water weatch station at Badra AI-Mansourya , Aal-Kut, Mundii, Bagahdad, and the rain dcame to river Dyala 0.4 miller M3 (2)[32].

2. Klal Trsukh

A wide lower in case and big surface of gone with AI-Nahrwan river which many branch goes same strength and depending on it's growth from water came from Iran north ofZurbatia and this waster are inside of Iraqi land and it collect together , to make big enter which made many places in developed the flow in lower east of Kut.

This income it can not make system to it when we follow in Al-Shabi because this low and some of farmer whom their lands is placed to it the make a dam by soil and they can irrigation after make some simple doors ,then they can irrigation and they closed when they need

3. AI-Nahrwah Low This lower is remain of AI-Narwan and water continue which came from river ofAlwand before making processing of Dyala Irrigation and make the Hamreen & Darbankhan Dam and this low is end at the Al-shweja and still the staff of irrigation they watching this low which full by water. This make the positive effect to lands inAI-Hafria SAzezya and they treated because of Importance because it is danger in same area specially in Winter season .

$$Mgr = \frac{Mnt}{WLXLFF}$$

Mgr = Gross irrigation rotate (mm) ata the farm outlet. Mnt = net irrigaation Rate)mm) WL = coefficient taking into account water losses FF = efficiency factor of farm . Average efficiency factor of farm field

Narrow place		Wlosses in the field/4		Far field losses		Farm field
Medium Place	Winter 22,2	Summer 30,7	Winter 33,3	'» Summer 41,8	Winter 0.75	Summer 0.70
The resources Ministry of Irrigation - Office of planning and follow-of irrigation for water in Iraq report published 1999.						

[31](1) . Mahdi M. AI-Sahaf , Water reesources in Iraqi, maintenance from the foreign materials. . Ministry of Information -AI-Huria Press for publish Bagahdad 1976.

[32] (2) Mahdi AI-Sahaf, & Wafiqa AlKhashab same reference ,1983, p 355-432 .

And it show in table above that total of water including around the farm field is between 30-36% during Winter (October-April and 36-43% during Summer (May -September) and efficiency of farm is about 0,74-0,77 atWinter 0.7-0.73,
This came as follow f.f. efficiency , P total of water in farm including the surface irrigation, steam in deep in the farm and its request washing, to find complete drainage to take in consideration spares which properly in irrigation canals .

Getting water for Crop Agriculture

1. there is a relation between quantity of water which is necessary to grow the plant and the land which is agriculture and the period of growth and deep of water which is necessary for it.
2. deep of water in mm.
3. time (period of plant grow(in second
4. drainage M3/S.
5. surface of agriculture by donum.

The table No. (13) C The areas of Summer and Seasonal production in 1995-1999

lo		1995	1996	1997	1998	1999
	Cotton	0.15	9180	23	15	14
	Mash	21	19	16.732	15	13
	Sesame	11	7495	18.500	13	15
	Spuds	33.0	4650	1500	3.500	4000
	Shajar	8705	1400	1550	1950	1400
	Bamiaa	1496	9838	8027	7737	8580
	Allspice	3210	-	922	1300	12
	Aubergines	6427	4226	8488	5100	6000
	Kidney bean	11.590	8153	1032	10000	7000
D	Tomatoes	5695	5544	5659	6886	6980
1	Cucumber	164.25	3275	32.392	19.3000	18.500
2	Melons	32.828	18.225	21.026	20	13
3	Water melons	3000	4800	1200	1750	1000
4	Millet	22.722	19.312	22.848	20	12

Table No 13 Cont.

5	Broad bean	35.500.	33.838	35.00	3000	32.839
"\	Alfalfa clover	50	42	37	27.500	25
7	Jat	11	17	17	12	1000
3	Onion	7000	7882	4	6000	12

Second : the need of water in industrial purposes water resources is consider as a very important element regarding industrial establishments in Wasit, there are some censer of industry for example cotton and wool textile factory and many other projects using water directly. There is establishment of needing water between these establishments regarding dither sizes. The general average is 4.5 M3/S on which is depend for all industrial established in Wasit.

The water request for Agriculture Irrigation .

This water is most important for development of Agriculture and growth , agriculture depended in Wasit Governorate the irrigation system by using nets for irrigation on Tigris river and Aljbab &Calal Badra.And in the south of Dyala river there is a number of irrigation pIroJect as AI-Swera project, Badra J^san and AI-Shhemea which take their water by press in front of Kut dam and there is many canals for many project of irrigation as AI-Dalmlch , Dujila . the surface of agriculture in Wasit Governorate since k1995-1999 we can know that the agriculture lands in Governorate in last year specially In 1999 was decreased the surface of agriculture because of less water resources in all the country and we can depend to the compare the surface which are agriculture in 1995 up to 1999 it reached to 1,499,243 & 883,239 as follow in Wast Governorate for both season .Table (14) show yearly water consume and No. of organization (4,1x60x60x25x12) (1)[33] It is clear that number of small organization are more than Med. Organization and the big one. Some like 98 % in area study (Wasit Governorate aand the big are 2% in same governorate.

fall Industry organization			Med. Industry Organization			Big Industry Organization		
iter Consume M3 thousand year	%	No	Water consume M3 The thousand Year	%	NNo	Water consume M3 The thousand year	%	No.
517536	12,6	1198	-	-	-	10368	6,8	24

The resource : Iraqi Republic - Ministry of planning Table No. (6)1993.

[33](1) Abdule ttah J. Hawa. Interdiction of the planning water resources Management Iraq.

3. Water request for Animals and fish

To have enough water for animal drinking is very important and the range for each one from the water according to type of animal as the range for each one ship is 2M3 year and cow some of 8 M2 per year so there is a different of type of animals which consume some of 6M3 per year.

Table No. (15) No of Agriculture special for fish which needs water for the years 1994 up to 2000 in Wasit Governorate

2000		1994		
Resource Irrigation	Surfaces of Agriculture In donum	Water Request M3 year 1000	Agriculture Surface Donum	Water request M3 year 1000
Tigris	2150	25800	2150	25800
Resources : Iraqi Republic - Ministry of Irrigation - the hall planning for the waster resource and farm in Iraq , water range -third stage - the fish in Iraq Enclosure No. (7) 1990 P. 54.				

4.Water request for human supply:- The river represented in water canals for people consume in Wasit Governorate, there is a different in the range of consume for each one between city and village and wecan say 89% of people in city the use pure water and the remain they use water not pure, and the medium average for people in city for drink and other houssejduty (212) liter per day in 1990 till reached to 262 liter per day in 1995d. and may be the range will rise to twice of this No.(1)[34].

Conclusion:

1.The most importance of water resources in Wasit Governorate are the river specially Tigris river the govenorate is depended on it more than any irrigation and drink water and other industrial usage and concern irrigation usage it depended on Tigris river starting of it enter to goyernorate close to Al-Swera city up out of city atShikh Saad city and each of Al-Ghraph guild and Dujdia are depended on this river starting from Kut dam including governorate surface with Dh-Qar Governorate that way Tigris river is main for irrigation .

2. concern the east area at (AI-Dirasa area) it depend on two rivers Klal Badra who came from Iran's land additional it depended also on Tigris river as Klal Badra drainage is about (2-3) in past years and the water started to become lower, and river Knjan who feed Zurbatia city is decreasing too because of decreasing his water resources and they establish the Knjan dam on by Iran .

[34] (1) Ali, Kh. Abdul AI-Khalik - Water resources in Iraq and it's effect on the Iraqi economy , Published in 1991 . P. 5

3. The governorate is depending on tap irrigation by using press and total No. in Wasit Governorate is (6382)press and this way it's efficiency is very low some like 50-60% concerning with drop irrigation which it's efficiency is 80-90% .
4. The second resource in governorate is from raining and the rain were decrease the many years ago as it's range is 0.01% from 1995-2000.
5. Decrease of rain is because of increasing in heat with less of win also decrease in wit.

Recommendation

1.To be used science system in agriculture Irrigation land by using drop which is used in south country which is success.
2.To have new committee to supervise and follow the irrigation projects in all Wasit Governorate.
3.Using HourAI-shweja for fish and make it economic resource.
4.Making dams on AI-Jbab river to store the water which came from Iran's land.
5.To supply press for Agriculture Irrigation because of decreasing in water in all country
6. To keep Kut dam from any decreasing in water because of many trucks which passing there.
7. To use a range for the agriculture special in canals with limit average of each one .
8. To maintenance the irrigation canal the main and branch onespecially in Wasit Governorate.
9.Maintenance k Tigris river from the river lands which is cause for change the flow rive .

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AUTOMATED VERSUS MANUAL LINEAMENT ANALYSIS

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The objective of this study is to compare lineament maps generated by automated and manual extraction methods using Landsat ETM data. Study area partly covers the North Anatolian Fault Zone in Turkey. The automated method first converts the image into a binary data and detects lines from this map using certain threshold parameters designed to identify various aspects of lineaments. In the manual method, on the other hand, several enhancement techniques including filtering operations, PCA and spectral rationing are applied to reduce the problems in the identification of the lineaments. Lineament maps obtained by manual method are combined into one single final map by eliminating repeated lineaments.

Comparison of the maps generated by automated and manual methods indicates that there are basic differences in the length, frequency and spatial distribution of the lineaments. Mean length of automated lineaments is 1.2 km which is 7.1 km for manual one. Total number of the lineaments is 3191 in the automated and 584 in the manual method.

Accuracy of both maps is tested by a fault map compiled from the literature. Computations made for the manual lineament map yielded an accuracy of 50.3 % which is much greater than that of automated one.

Keywords: *Lineament analysis, Automated Extraction, Manual Extraction*

1. Introduction

Lineaments are defined as mapable linear surface features, which differ distinctly from the patterns of adjacent features and presumably reflect subsurface phenomena (O'Leary et al., 1976). Satellite images and aerial photographs are extensively used to extract lineaments for different purposes. Since satellite images are obtained from varying wavelength intervals of the electromagnetic spectrum, they are considered to be a better tool to discriminate the lineaments and to produce better information than conventional aerial photographs. (Casas et. al., 2000)

Lineaments are extracted from satellite images by using automated and manual line extraction techniques. In the automated lineament extraction the available software's uses different algorithm to extract lineaments from satellite images in a short time. Commonly used algorithms are Hough transform, Haar transform and Segment Tracing Algorithm (STA). In this study, Line option of the PCI Geomatica software used for automated line extraction. The line extraction algorithm of the used method is similar to STA software first converts the image into a binary data and detects lines from this map using certain threshold parameters designed to identify various aspects of lineaments such as curvature, linking distance, angular difference etc. In manual extraction method, lineaments are extracted from satellite image by using visual interpretation techniques. Lineaments usually appear as straight lines or "edges"

on the images which in all cases contributed by the tonal differences within the surface material. The knowledge and the experience of the user is the key point in the identification of the lineaments particularly to connect broken segments into a longer lineament (Wang et al., 1990). In this study several enhancement techniques including filtering operations, Principal Component Analysis (PCA) and spectral rationing are applied to reduce the problems in the identification of the lineaments.

In this study lineaments are extracted from Landsat ETM data using automated and manual line extraction techniques and result of generated lineaments maps are compared in terms of their length, frequency and spatial distribution. Comparison of two maps indicate that the manually extracted lineament map is more reliable in terms of length of the lineaments, their segmentation, spatial distribution and orientation. The result of the manually extracted lineament map is compared with fault map of the study area so the relation between lineaments and previously defined faults of the area is determined.

2. Study Area

The study area is located to the northwest of Ankara province. The area is within Zone 36 of Universal Transverse Mercator projection system. The upper left and lower right coordinates of the study area are 4529790N-357703E and 4426164N-471475E, respectively (Figure1). The total area covered is 11786 km^2. Major cities within the area are Bolu, Gerede, Çamlıdere, Kızılcahamam, Beypazarı, Seben and Güdül

Morphologically the area is a mountainous region. The minimum and maximum elevation in the study area is 351 and 2367 m, respectively. The area is characterized by NEE-SWW trending topographic ridges particularly in the northern and southern parts.

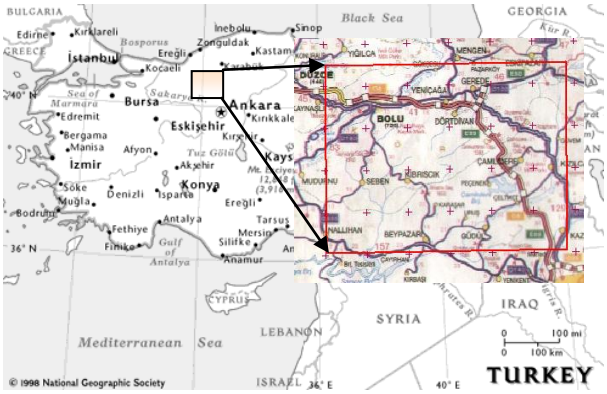


Figure.1. Location map of the study area.

3. Method of the Study

Satellite image of the area is the main data used in this study. It is used for the extraction of lineaments. Considering spatial resolution of the available satellite images and the size of the study area, the subset of the Landsat ETM image acquired on 2000-07-04, Path 178 and row 032 Earth Sat Ortho, GeoCover is used in this study (Figure 2). The image is composed of 3123 rows and 4018 columns. It has eight bands sensitive to different wavelengths. Six of these bands detect visible (1, 2, 3), near infrared "NIR" (4), short wave infrared "SWIR" (5, 7), one thermal and one panchromatic. Lower resolution satellite image (e.g. 80 m and larger cell size) may not be suitable to detect the lineaments. Higher resolution images, on the other hand, may complicate the process and can detect minor lineaments not interested in.

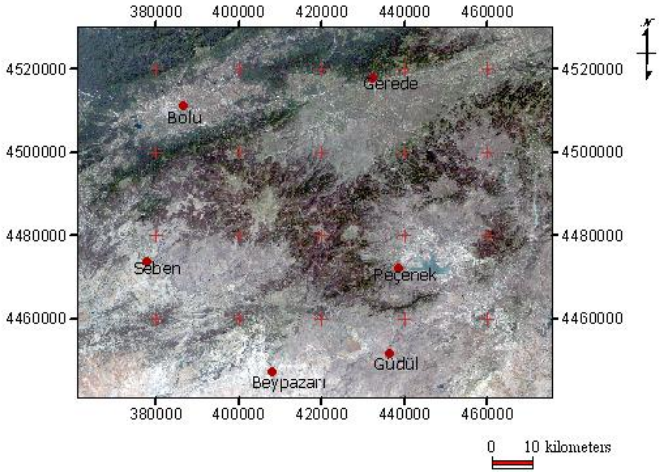


Figure 2. True color composite Landsat ETM image of the study area

4. LINEAMENT EXTRACTION

4.1.Automated Lineament Extraction

Lineaments are extracted from satellite images using automated extraction techniques. The main advantages of automated lineament extraction over the manual lineament extraction are its ability to unvarying approach to different images; processing operations are performed in a short time and its ability to extract lineaments which are not recognized by the human eyes.

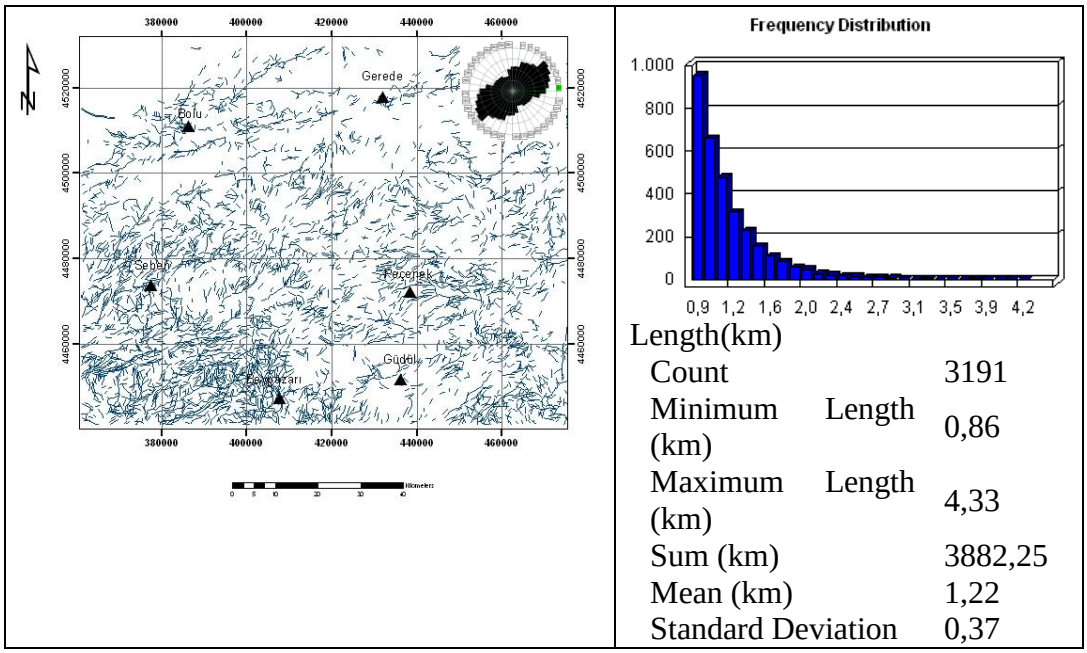
The automated lineament extraction in this study is performed by the LINE module of Geomatica software. The logic of this method is similar to STA. A brief explanation of the algorithm of this module will be given here. This information is provided from the Geomatica users' manual (2001).

Algorithm of Automated Lineament Extraction by Geomatica:

LINE module of Geomatica extracts linear features from an image and records the polylines in vector segments by using six parameters. The algorithm of the LINE consists of three stages: edge detection, thresholding, and curve extraction.

In the first stage, the "Canny edge detection algorithm" is applied to produce an edge strength image. The Canny edge detection algorithm has three substeps. First, the input image is filtered with a Gaussian function whose radius is given by the RADI parameter. Then gradient is computed from the filtered image. Finally, those pixels whose gradient are not local maximum are suppressed (by setting the edge strength to 0). In the second stage, a threshold is applied for the edge strength image to obtain a binary image. Each ON pixel of the binary image represents an edge element. The threshold value is given by the GTHR parameter. In the third stage, curves are extracted from the binary edge image. This step consists of several substeps. First, a thinning algorithm is applied to the binary edge image to produce pixel-wide skeleton curves. Then a sequence of pixels for each curve is extracted from the image. Any curve with the number of pixels less than the parameter value LTHR is discarded from further processing. An extracted pixel curve is converted to vector form by fitting piecewise line segments to it. The resulting polyline is an approximation to the original pixel curve where the maximum fitting error (distance between the two) is specified by the FTHR parameter. Finally, the algorithm links pairs of polylines which satisfy the following criteria: (1) two end-segments of the two polylines face each other and have similar orientation (the angle between the two segments is less than the parameter ATHR); (2) the two end-segments are close to each other (the distance between the end points is less than the parameter DTHR).

The automated lineament extraction operations are applied on Landsat ETM scene by using PCI EASI/PACE software line option. Band 7 of the image with a spatial resolution 30*30 meter is selected for automated lineament extraction considering the purpose of this study; since this band is useful for discrimination of lineaments and other geological features such as mineral and rock types and is also sensitive to vegetation moisture content (Sabins, 1996). The extraction process is manipulated changing the six parameters. The most suitable threshold values are selected (below) considering these lineaments as fault lines. General properties of faults are taken into consideration such as the length, curvature, segmentation, separation and so on in order to determine the threshold values. The parameters in this application are selected as follows: The size of Gaussian kernel which is used as a filter during edge detection 10 (RADI), Spectral difference at the edge is about 30 % (GTHR), Threshold for curvature is 30 pixels suggesting almost straight lines (LTHR), Line fitting error is (FTHR) 3 pixels that does not let identification of closely spaced lineaments within 90 meters, Angular difference threshold (ATHR) is 1 degrees used for segmentation, Linking distance threshold (DTHR) is 40 pixels (1200 m) that corresponds to the distance used to link two segments. The result of generated lineament map and its frequency distribution is given in Figure 3.



Length(km)

Count		3191
Minimum Length (km)		0,86
Maximum Length (km)		4,33
Sum (km)		3882,25
Mean (km)		1,22
Standard Deviation		0,37

Figure3. Automatically extracted lineaments and its frequency distribution.

4.2.Manual Lineament Extraction

In manual extraction method, the lineaments are extracted from satellite image by using visual interpretation techniques. Lineaments usually appear as straight lines or "edges" on the satellite images which in all cases contributed by the tonal differences within the surface material. Some general features, however, help to identify the lineaments can be listed as follows as already described in the literature: Topographic features such as straight valleys, continuous scarps, straight rock boundaries, systematic offset of rivers, sudden tonal variations, alignment of vegetation.

There are several image enhancement techniques that can contribute to manual lineament extraction. In this study four of commonly known techniques will be used in the preparation of the final lineament map. These are filtering operations, Principal Component Analysis (PCA), spectral rationing and the color composites.

Filtering operations

One of the characteristic features of the satellite images is a parameter called spatial frequency which is defined as the number of changes in brightness value per unit distance for any particular part of an image. If there are very few changes in brightness value over a given area in an image, this is referred to as a low-frequency area. Conversely, if the brightness values change dramatically over short distances, this is an area of high frequency detail (Jensen, 1996). Therefore, filtering operations are used to emphasize or deemphasize spatial frequency in the image. This frequency can be attributed to the presence of the lineaments in the area. The main disadvantage of the filtering method is that it cannot effectively extract lineaments in low-contrast areas where features extended parallel to the sun directions and in mountain shadows (Koike et al., 1995).

Directional Gradient-Sobel and Gradient-Prewitt filters are applied to the Landsat ETM band 7 in N-S, E-W, NE-SW and NW-SE directions to increase frequency and contrast in the image. The directional filters in four principal directions are given in Table 1.

Table 1. Sobel and Prewitt filters in four main directions applied in this study.

	N-S			NE-SW			E-W			NW-SE		
SOBEL	-1	0	1	-2	-1	0	-1	-2	-1	0	1	2
	-2	0	2	-1	0	1	0	0	0	1	0	1
	-1	0	1	0	1	2	1	2	1	-2	-1	0
PREWITT	-1	0	1	-1	-1	0	-1	-1	-1	0	1	1
	-1	0	1	-1	0	1	0	0	0	-1	0	1
	-1	0	1	0	1	1	1	1	1	-1	-1	0

Two maps are prepared from these images; one for Sobel and the other for Prewitt. The result lineament map for Sobel filters and its frequency histogram is shown in Figure 4. The map and frequency histogram for the Prewitt filters, on the other hand, are shown in Figure 5.

The number of the lineaments identified in these two filters is considerably different. The number is 318 for Sobel and 214 for Prewitt. Visual comparison of the two maps suggests that most of the additional lines in Sobel filters are homogeneously distributed over the area except close vicinity of Seben.

The average length of the lineaments is 5.7 km for Sobel and 5.5 km for Prewitt. The longest lineament is about 21 km east of Gerede (Figure5). This maximum value, however, is less than the expected value because the presence of North Anatolian Fault Zone (NAFZ) is already known in the area that passes through Bolu and Gerede.

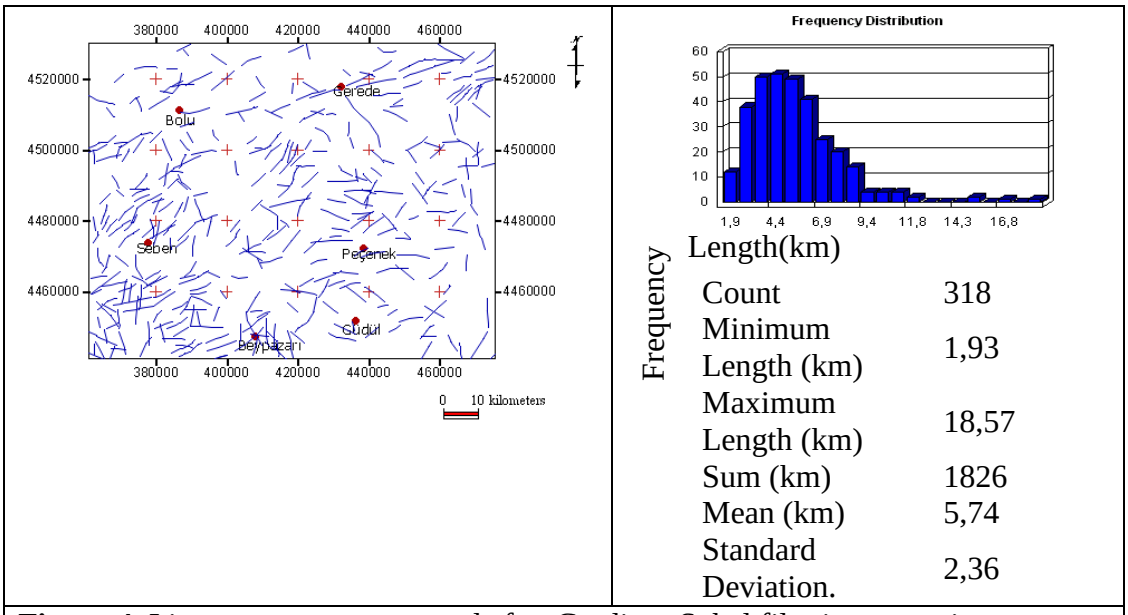
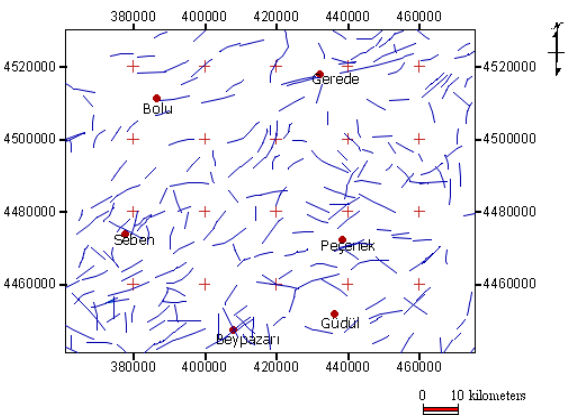
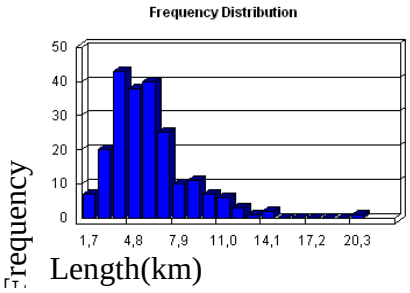


Figure 4. Lineament map generated after Gradient-Sobel filtering operation.





Count	214
Minimum Length (km)	1,69
MaximumLength (km)	21,16
Sum (km)	1338
Mean (km)	6,25
Standard Deviation	2,66

Figure 5. Lineament map generated after Gradient-Prewitt filtering operation.

Principal Component Analysis (PCA)

PCA is an image transformation technique based on the processing of multi-band data sets that can be used to reduce the dimensionality in the data, and compress as much of the information in the original bands into fewer bands. Thus, useful information for the identification of the units that exist within the image can be compressed properly into two or three components.

For manual lineament extraction, PCA is applied to six bands (1, 2, 3, 4, 5 and 7) of Landsat ETM image to compress the information in three bands. A false color composite of the first three principal components is created as shown in Figure 6.A total of 128 lineaments are manually identified using the image after PCA. The resultant lineament map and its frequency distribution are shown in Figure 6B. and 6C. Although the number of lineaments is less than those obtained in the filtering operations, they are longer than lineaments obtained in the previous section with an average length of about 9 km. Total length of all lineaments is 1167 km in this analysis.

Pattern of the lineament map (Figure 6B) suggest that some faults that belong to the NAFZ zone are not properly identified particularly around Bolu. Lineaments in other parts especially in the southern section between Seben, Peçenek and Beypazarı display a typical pattern of the faults as already reported in the literature.(Öztürk et al.1985, Rondot 1956, Türkecan et al. 1991, Demirci 2000, Öngür 1976, Ürgün 1972, Erol 1954, Şaroğlu et al. 1995)

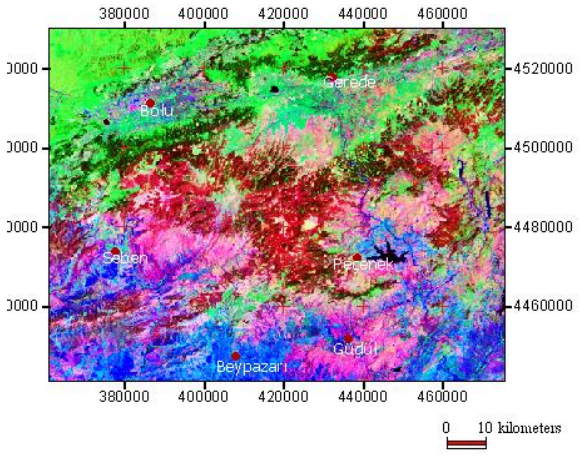


Figure 6A. False color composite of PCA 1 (Red), 2 (Green), and 3 (Blue).

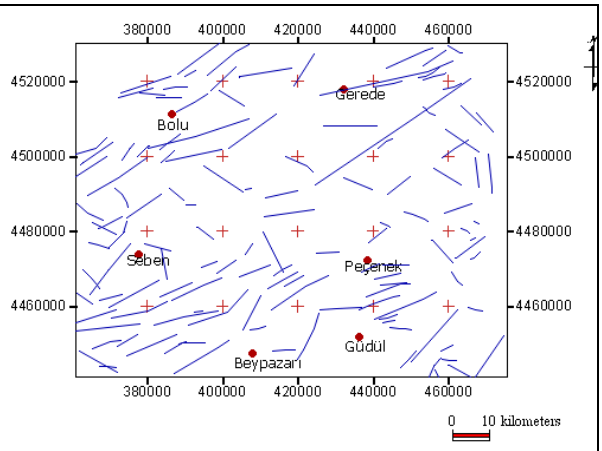
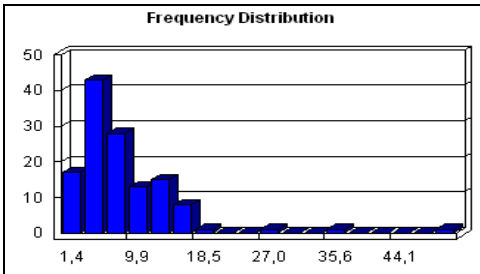


Figure 6B. Lineaments extracted from PCA



Count	128
Minimum Length (km)	1,37
Maximum Length (km)	50,17
Sum (km)	1167,44
Mean (km)	9,12
Standard Deviation.	6,32

Figure 6C. Frequency distribution of Lineaments result of PCA.

Spectral Rationing

Rationed images are useful usually for discriminating spectral variations in an image that are masked by the brightness variations. This enhanced discrimination is due to the fact that rationed images clearly display the variations in slopes of the spectral reflectance curves between the two bands involved, regardless of the absolute reflectance values observed in the bands (Lillesand, 1999). By rationing the data from two different spectral bands the variations in the slopes of the spectral reflectance curves between the two different spectral ranges are enhanced and the variations in scene illumination as a result of topographic effects are reduced. According to Sabins, ratio images combined in RGB offer greater contrast between the units in the image than do individual TM band false color images.

Spectral rationing is used for manual lineament extraction in order to visually improve the interpretability of the image and to help the extraction of geomorphologic lineaments which is affected by topography. Ratios of bands 5/7, 2/3, and 4/5 are selected and used to produce a false color composite (RGB: 5/7, 2/3, 4/5) for manual lineament extraction. The resultant image used for the extraction of lineaments is shown in Figure 7A. The lineament map and its frequency distribution are shown in Figures 7B and 7C, respectively.

Total length of lineaments is 972.6 which is the lowest value in all methods. Number of lineaments is 146 and the maximum length is 44.23 km. One distinguishing feature of this fault map is that, the NAFZ is best identified between Bolu and Gerede. Frequency of the lineaments is higher around Peçenek and Güdül. South of Gerede is the area with the least lineaments.

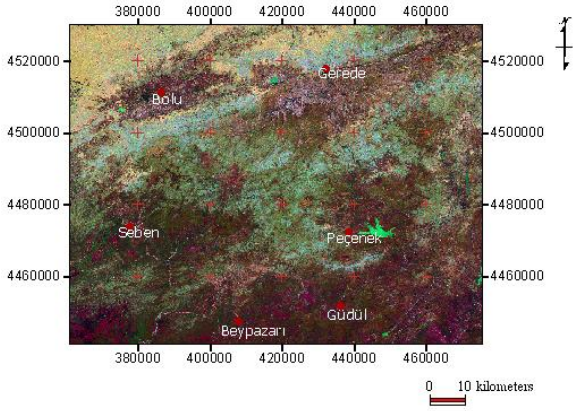


Figure 7A. Color composite of band 5/7, 2/3 and 4/5 ratios.

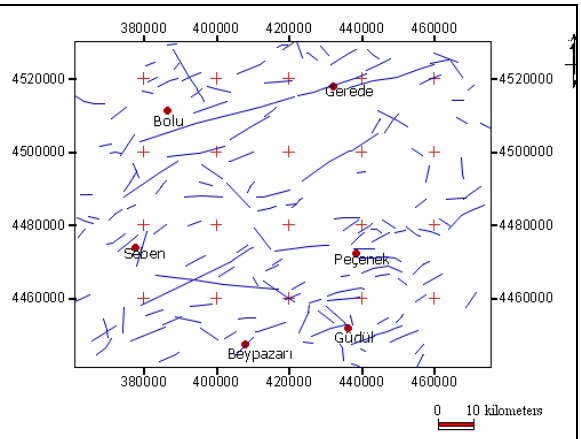
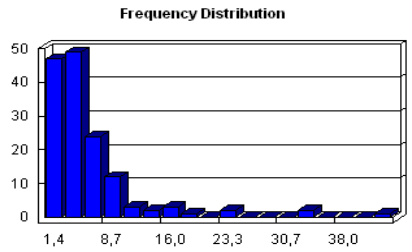


Figure 7B. Lineament map extracted from band rationing.



Count	146
Minimum Length (km)	1,36
Maximum Length (km)	44,23
Sum (km)	972,61
Mean (km)	6,66
Standard Deviation	5,96

Figure 7C. Frequency distribution lineaments result of band rationing.

Color Composite

The human eye can only distinguish between certain numbers of shades of gray in an image; however, it is able to distinguish between much more colors (e.g. a few hundred different colors). Therefore, a common image enhancement technique is to assign specific digital number (DN) values to specific colors to increase the contrast of particular DN values with the surrounding pixels in an image. Color images, especially digital ones, are superior for many applications, especially if they are "false-color".

False color images are produced for manual lineament extraction because they increase the interpretability of the data. Different combinations of three bands are examined and the best visual quality is obtained with a false color image utilizing three near-IR bands 2, 3 and 4 (in blue, green and red respectively) (Figure 8A). This false color combination made it easier to identify linear patterns of vegetation, geologic formation boundaries, river channels, geological weakness zones. From the visual interpretation of the false color composite 128

lineaments are extracted (Figure 8B). The length and frequency distribution of manually extracted lineaments are illustrated in Figure 8C.

Maximum length of the lineament is 54.12 km which is the longest line identified in all methods. Similar to the previous method (rationing) the NAFZ is well identified in this method. Frequency of the lineaments is high around Seben, Peçenek and Güdül which is consistent with other methods. Almost similar to other methods the least lineaments are identified south of Gerede and northeast of Seben.

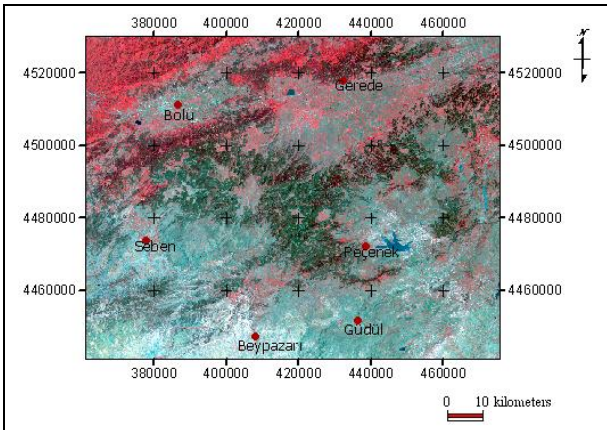


Figure 8A. Color composite of the band 2 (Blue), 3 (Green), 4 (Red).

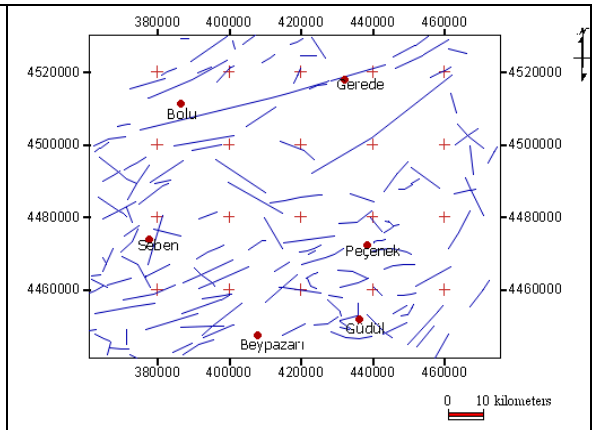
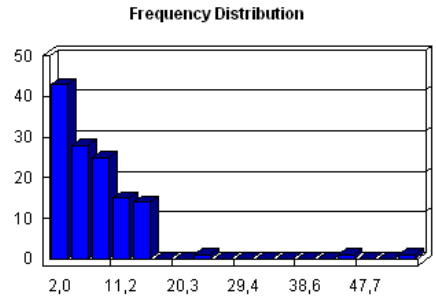


Figure 8B. Lineament map extracted from color composite of the band 2, 3, 4



Count	128
Minimum Length (km)	2,02
Maximum Length (km)	54,13
Sum (km)	1112,89
Mean (km)	8,69
Standard Deviation	6,80

Figure 8C. Histogram of the lineaments for color composite

4.3.Final Map Generation

There is not a commonly accepted method to prepare the final lineament map. Although any of these techniques (or combination of more than one) can be used to extract lineaments, four different techniques are applied here in order to be sure that no lineament is missed in the area. The reason for this is that the area is not homogenous in terms of the surface characteristics, and it is believed that each method may enhance one aspect of the surface.

In order to generate final map: First, a map will be prepared for each method. Then, a single map will be generated from these four maps in which the repeated lineaments will be deleted. The main reason for using several techniques is that one single method may not detect all the lineaments because of the variation in the nature of surface material in the area such as variations in the vegetation density, topographic texture and elevation.

Each process will generate a GIS layer that can be linked to other layers easily. Presence of multiple lineament maps, however, may result in confusion and complexity. To overcome this problem a single lineament map should be generated from the results of all these methods. The procedure for combining the lineaments obtained from all methods into one map is shown in Figure 9. Accordingly, here is always one output file which is overlaid every time on a different processed image (red lines are new lineaments extracted from corresponding process; black lines are those transferred from previous one). In this study, four methods produced five outputs (two for filtering) suggesting five overlay analyses. Following steps are applied for the generation of final map:

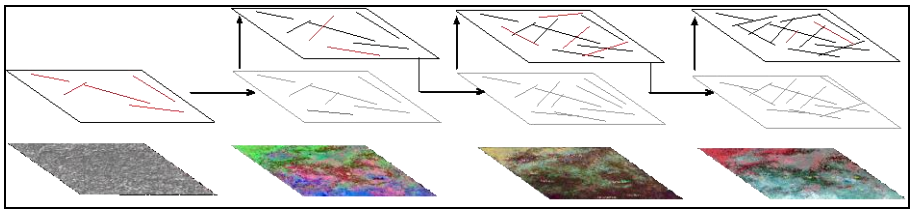


Figure 9. Steps of combining the lineament maps generated by different methods.

- Manually extracted lineaments are overlaid onto the same map, one map at a time. The order of the overlay analysis is not important during this process. The order used in this study is applied for this step.
- Duplicated lineaments are erased from the map every time a new layer is added. Erasing of duplicated elements is performed by manual interpretation. In case of different lengths, the shorter lineaments are deleted.

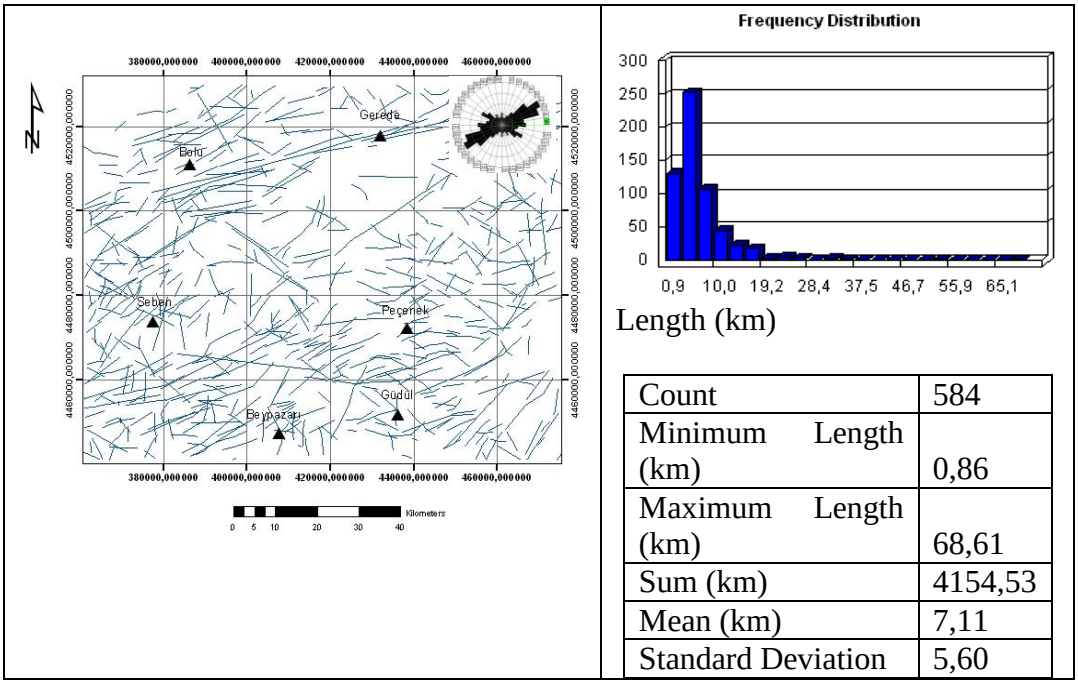
The final map generated after adding all lineaments are combined and those that correspond to the roads are erased (Figure 10). The histogram and basic statistics of this map are also illustrated in Figure 10. Comparison of this map with individual maps produced by above mentioned methods is given in Table 2. Following observations can be made on the final map:

- Total number of lineaments in generated by different methods is 934. The total number in the final map, 584, suggests that 350 lineaments are deleted that correspond to duplicated lineaments including those that match the roads.
- The maximum frequency of lineaments is 318 in Sobel filtering which is about 54 % of the final map. This value decreases to 22 % in rationing and color composite processes. All these suggest that none of the single method is enough to detect the lineaments existing in the area.

- Total length of the lineaments in final map is 4154.5 km which is 3 or 4 times greater than any map produced by individual methods. Two reasons for this difference are that: 1) Only smaller lineaments are deleted during the combination of maps, and 2) each method had produced considerable amount of lineaments which are spatially different from each other.
- The maximum length of the lineaments is increased to 68.61 km suggesting that during generating of final map, some segments are combined to yield longer lineaments.
- Although the distribution of the frequency of the lineaments identified is different in different parts of the area, certain parts are lacking lineaments. Two of these regions are northwestern part of the area and south of Gerede (Figure 10).
- The lineaments along the NAFZ (along Bolu-Gerede) are overemphasized in the final map which is not observed in any single map of five processes.

Table 2. Comparison of basic statistics of the final map with other maps produced by different methods.

	Filtering		**PCA**	**Rationing**	**Color composite**	**FINAL MAP**
	Sobel	**Prewitt**				
Count (frequency)	318	214	128	128	146	584
Maximum Length (km)	18.57	21.15	50.17	54.12	44.23	68.61
Total Length (km)	1825.5	1337.7	1167.4	1112.9	972.6	4154.5
Mean length (km)	5.74	6.25	9.12	8.69	6.66	7.11



Count	584
Minimum Length (km)	0,86
Maximum Length (km)	68,61
Sum (km)	4154,53
Mean (km)	7,11
Standard Deviation	5,60

Figure 10. Lineament map and basic statistics of the manually extracted lineaments.

4.2.4. Map Verification

Comparison of two maps can yield following observations:

- Frequency of automatically extracted lineaments is greater more than 5 times of the manually extracted ones (3191 versus 584). The most important factor for this is that the lineaments in automated one are shorter in length so that a few of them could be combined to form one line in manually extracted map. Although the linking distance threshold is assigned as 1200 m (40 pixels), the program could not combine segmented lines.
- Automatically extracted map is not made a correction for the map road that might be a secondary reason for this high frequency.
- Although the frequency of the lineaments is higher in automated one, the total length of all lineaments is still less than the lineaments (3882.25 km versus 4154.53 km) identified by manual methods. This feature is best illustrated by the mean lengths of automatic and manual lineaments which are 1.21 km and 7.11 km, respectively.
- Spatial distribution of the lineaments in both maps is considerably different. In the automated one the frequency of the lines seems to be higher in the southwestern part of the area, particularly in the close vicinity of Beypazarı. In the manual one, on the other hand, lineament frequency is higher along the line between Bolu and Gerede (that fits the North Anatolian Fault Zone).
- The pattern of the two maps although in general look similar, there are some minor (but important) differences among them. For examples about 10 km south of Bolu is totally different in both maps. This is lacking lineaments in the automated one but is full of lines in the second. Other examples of such areas are southeastern part of the area, close vicinity of Peçenek, south of Beypazarı, and south and southeast of Seben.
- Length of the maximum lineament detected by automated one is 4.3 km which is not a proper length for the faults in the area. This length, however, is 68.6 km for manual one which is quite reasonable.
- Orientation of the lineaments for both lineament maps are compared using the rose diagrams. The diagrams are prepared using the frequencies of the lineaments and therefore are not length-weighted. Two diagrams show great similarities as being concentrated in NE-SW direction. They differ, however, in two minor aspects: 1) automated ones cover a wide range whereas the manual ones are confined to a narrow interval in N45E to N75E; 2) a second minor direction is identified in manual one in NW-SE direction which is missed in the automated one.

Comparison of two maps indicates that the manually extracted lineament map is more reliable in terms of length of the lineaments, their segmentation, their spatial distribution and their orientation. Although, the extraction of the automated ones is performed with different threshold values, the one presented here is the best output considering these lineaments as fault lines. Therefore, the manual extraction produces better results most probably due to the experience of the user involved in the processes. For this reason the output of the automated one will not be considered in the rest of the thesis.

5.1. Testing Lineament Map with Fault Map

The accuracy of the manually extracted final lineament map is tested by the help of the fault data. The accuracy of lineament map is computed by using GIS overlay technique that determines where the lineaments and faults are matched. For this operation a buffer zone of 150 m is assigned to the extracted lineaments that test the matching segments of the lineaments and the faults. The output of this operation produces three types of lines: Non-matching lineaments, Non-matching fault lines, matching lineaments and fault lines. The matching segments are stored in the database. The ratio of total length of recorded elements to the total length of the fault lines is calculated to yield the accuracy of the lineament map.

Lineaments and the fault lines are shown together in Figure 11.A by blue and red lines, respectively. Blue lines are dominating in the figure because the total length of lineaments (4154 km) is almost twice of the fault lines (2098 km). These two sets are intersected as mentioned above to find the common line segments. The resultant map is shown in Figure 11.B

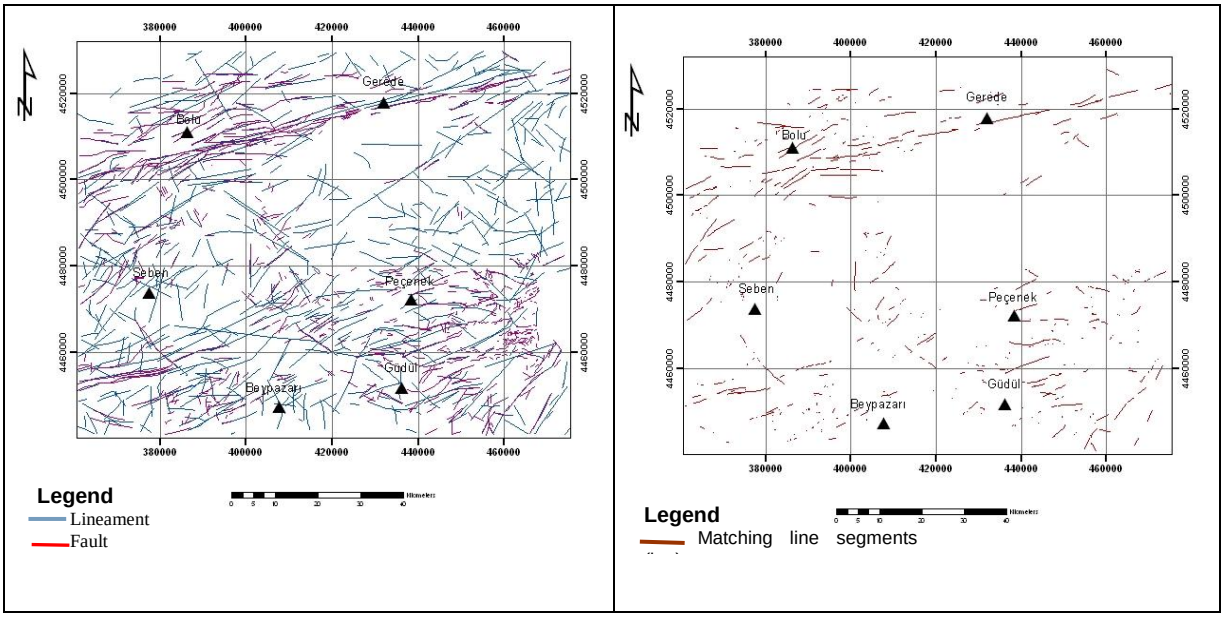


Figure 11. A Lineaments (blue lines) identified by the manual extraction and the faults (red lines) compiled from the literature.

B. Matching line segments of lineaments and fault lines determined by the intersection of two sets.

According to the final map produced by intersecting lineaments and the fault lines, in some parts of the area a dense population of matching segments is observed. These areas are obvious along the North Anatolian Fault Zone (Bolu-Gerede line), around Peçenek and Güdül, west of Beypazarı, and the area between Seben and Peçenek. In some other parts of the area, however, such as between Gerede and Peçenek, between Beypazarı and Güdül, and south of Seben no matching segments are detected. The main reason for this is that the fault lines are already not mapped in these areas.

Total length of intersection is calculated to be 811.79 km (Table 3). This is 38.7 % of the faults identified in the area which also defines the accuracy of the lineament map prepared in this study for the whole area. Since the fault map is composed of several maps at different scales prepared by different groups, it is natural that the reliability of the fault map can be questioned. For this reason it is decided to test accuracy of the lineament map for one of these studies which aims to map the faults. The work performed by Öztürk et al. (1985) is such a study carried out along the North Anatolian Fault Zone.

Table 3. Length and ratio of the matching lineaments for the whole area.

Total lineament length (km)	4154.53
Total fault length (km)	2098.05
Total matching length (km)	**811.79**
Matching length/Fault length (%)	**38.69**

The map prepared by Öztürk et al. (1985) contains 10 topographic sheets at 1/25.000 scale between Bolu and Gerede. This area is cropped from both lineament map and fault map. The same process (mentioned above) is applied to this sub-map to compute the accuracy for this area. The length and the ratio of the matching lineaments are given in Table 4. Accordingly, the accuracy of the lineament map increases to 50.28 %.

Table 4. Length and ratio of the matching lineaments for the area mapped by Öztürk et al. (1985).

Total lineament length (km)	725.88
Total fault length (km)	637.35
Total matching length (km)	**320.49**
Matching length/Fault length (%)	**50.28**

Conclusion

Automated lineament extraction does not work properly to identify the faults or fault zones existing in the area. The problem faced in this study is related to the length and the pattern of the faults. For this reason, it is decided to use the manually extracted lineaments for further analyses.

Manual method is believed to extract the lineaments successfully in the area. Resultant lineament map is tested with the fault map of the area compiled from literature. The map compiled can be questioned for is reliability because in most parts the purpose of the mapping is not to identify the faults. Therefore, the overall accuracy of the lineament map is 38.69 %. This accuracy increases to 50.28 when tested for the section around the NAFZ.

The contributions of the lineaments maps in introducing the faults in the area are: 1) there are several other fault zones in the area with equal densities of the NAFZ. These zones are observed in the southwestern, northeastern and southern parts of the area, 2) central parts of the area contain more faults than indicated by fault map of the area. Most probably these faults could not be mapped due to dense vegetation and rough topography, 3) a second trend of the fault other than the NE-SW direction (trend of the NAFZ) is emphasized in the area. This trend is NW-SE and is commonly observed in the central parts of the area.

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THE EFFECTS OF TELECOMMUTING ON SUSTAINABLE URBAN DEVELOPMENT AND ENVIRONMENT

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The main objective of this paper is to investigate relating to Information and Communication Technologies (ICT), urban development and environment. This paper critically reviews the relations between environment and the role of telecommuting in contemporaray cities. The main environmental effects of telecommuting are with regard to transport, energy and material consumption. This paper highligts key questions regarding information and communication technology that have the greatest potential for telecommuting. The paper begins with a brief summary of telework and forms. It then turns to an analysis of the impact of telework on urban systems. Finally, potential research questions regarding the impact of teleworking on urban development, taransportation systems and environment are examined. From policy and planning perspectives, it is important to learn the effects of information technology in general, and telecommuting in particular, on urban development patterns. This paper also points out that the effects of telecommuting on location decisions of households and offices.

1. INTRODUCTION

Technology has always had influence on the form of settlements, but only since the coming of ICT has it aroused much interest from academics and planners (May, 1998). Information and telecommunication advances in recent years have widened the choice of workplace for workers. They can work wherever including at home. In effect, telecommunications services are substituted for transportation to a conventional office or other workplace. This practice is called "telecommuting." Telecommuting is of current interest because of its potential transportation implications, especially with respect to air quality and congestion relief. The Clean Air Act, as amended in 1990, requires that stringent measures be taken in many regions to reduce air pollution through constraints on vehicular traffic. Telecommuting is seen by many as an important tool in managing demand for transportation. In addition to lower congestion and less air pollution, potential benefits could include reduced national petroleum use, fewer highway accidents, and eased transportation infrastructure requirements. Other significant possible benefits include reduced national energy and petroleum use, fewer highway accidents, and eased transportation infrastructure requirements (http://ntl.bts.gov/DOCS/telecommute.html).

2. DEFINITONS AND CLASSIFICATION OF TELECOMMUTING

Initially, the definition and kinds of telecommuting should be made in order to evaluate the impacts of telecommuting on urban development and environmental sustainability.

2.1. Definition of Telecommuting

"The term telecommuting is attributed to Jack M. Nilles who first used it in 1973. He defines telecommuting as a subset of teleworking" (http://ntl.bts.gov/DOCS/telecommute.html). The definitions of telework/telecommuting are many and varied. The European Commission defines telework as: "a method of organising and/or performing work in which a considerable proportion of an employee's working time is: away from the firm's premises or where the output is delivered; and when work is done using information technology and technology for data transmission, in particular the Internet"(European Commission, 2001).

According to another definition, telecommuting is working from a remote location (often ones home workstation) using computers, telephones, facsimile machines, and other remote capabilities, rather than commuting via automobile or other mode of transportation to and from an employer's work site to perform equivalent work (http://www.gilgordon.com/telecommutesafe/WhatIsTelecommute.html).

Telework has two essential characteristics: work that is carried out away from the designated place of work and the change in location is made possible by the use of modern ICT (Anonymous, 2003).

2.2 Kinds of Telework and Their General Characteristics

To begin the discussion, the three types of telework can be defined: home-based teleworking, tele center-based teleworking (satellite offices, neighborhood work centers), and mobile teleworking.

2.2.1. Home-Based Teleworking

Home-based teleworking refers to employees who work at home on a regular basis, though not necessarily every day. A person can be said to be a telecommuter if her/his telecommunications link to the office is as simple as a telephone. However, telecommuters often use other communications media such as electronic mail, personal computer links to office servers, and fax machines. Either the firm or the employee purchases the homebased equipment (Kurland and Bailey, 1999).

2.2.2. Work in Telecentres

The concept of telecentres has featured in debate for several years and is potentially interesting in certain situations, but it is unlikely to become a widespread form of telework. The falling price of computer hardware and the growth of internet connection points in public places means we are likely to lose interest in telecentres. Work location will be less significant than the option to work in different places (Anonymous, 2003).There are two basic variants of the telework center concept: satellite and neighborhood centers. For all of these, the common criterion is that they are close to where the telecommuters live, and the telecommuters work there instead of or in addition to working at home (http://ntl.bts.gov/DOCS/telecommute.html).

2.2.3. Mobile Teleworking

In contrast to telecommuters who work from one designated location outside the main office and who communicate with the office using electronic communication, ***mobile workers*** are frequently on the road, using communications technology to work from home, from a car, from a plane, or from a hotel-communicating with the office as necessary from each location. Mobile workers thus are accustomed to working in an assortment of locales. In an airport waiting lounge, one author recently overheard a woman ask a mobile worker, working on his laptop, where his office was. "Actually," he responded, "you're sitting in it" (Kurland and Bailey, 1999).

3. TELECOMMUTING AND THE FUTURE OF URBAN DEVELOPMENT

Telecommuting affect urban development directly and indirectly in an enormous number of ways. It is impossible to discuss issues related to urban development without including the impact of this new working way. Mokhtarian(2000) pointed out that some researchers have observed that technology is a facilitator of location change but that other factors (for example, cheaper land or labor) actually drive the change. Thus, the attribution of "causality" to telecommunications is somewhat delicate. She also noted that technology can facilitate increased centralization as well as decentralization, possibly both simultaneously at different scales (for example, decentralization at the metropolitan scale but centralization at the superregional scale).

3.1. Changes in Residential Location and Urban Sprawl

As telework reduces travel needs it may encourage residential relocation to sites farther from the workplace, looking for cheaper prices or a more attractive environment. As a result of these changes the total transport volume could not be reduced by teleworking or even could be increased. On the other hand, the general environmental consequences of this new stimulus for urban sprawl will probably be quite negatives. Mokhtarian et al. (1995), Lyons et al. (1998) report that telework would influence future house move decision. Nevertheless, they underline that there is "no clear indication of the magnitude of the implications from the responses". Nilles (1996) also notes that in tests made on real cases of teleworkers, "There is no clear evidence do date of any sprawl effects; most of the telecommuters who moved during our tests periods either moved to locations about the same distance from their non-home workplace or moved to another town where, presumably, a local telecenter could act as a surrogate principal office". Anyway, Nilles underlines that is necessary to be cautious with these findings, because the surveys don't cover a time span long enough to study these effects, which are supposed to happen in the long run. Mokhtarian and other experts point out the similar cautions due to the short term covered by the studies (European Commission, 2001).

"Telecommuting is sometimes portrayed as a means of increasing the jobs-housing balance in urban and suburban areas by enhancing the ability to move work to, or closer to, the workers' residences rather than requiring workers to commute to work daily. This has the immediate side effect of decreasing automobile congestion and associated energy consumption and air pollution. However, there is a possible long-term adverse impact of telecommuting resulting from its ability to decrease constraints on household location, thereby enhancing the rate of spread of suburbia. Nilles(1991) reviews evidence concerning the possible effects of telecommuting on urban sprawl, the continuing urbanization of formerly rural areas. One consequence of urban sprawl is jobs-housing imbalance, the locations of employee residences change while work-site locations either do not change or follow the housing trends slowly" (http://ntl.bts.gov/DOCS/telecommute.html).

As Pratt reports: "Evidence regarding the impact of telecommuting on residential relocation is mixed. In the 2-year data collection period of the California Pilot Project, 6 percent of the telecommuters indicated that they had moved, or were considering moving, 45 or more miles farther from work since they began to telecommute. Of all those who moved or were considering moving, 28 percent reported that the ability to telecommute played a significant or decisive role in the choice. It is important to note, however, that no significant difference existed between actual moves of the telecommuters and those of a control group, suggesting that on the whole, the moves that did occur would have taken place anyway. In this particular study, any net increases in VMT(Vehicle Miles Traveled) traveled because of long-distance moves were more than compensated for by travel savings on the part of others. However, these are only short-term results (for a relatively small sample); long-term residential relocation trends are likely to be more pronounced"(Pratt, 1991). These factors are not incorporated in the estimates that follow. However, they represent an important area of future research (http://ntl.bts.gov/DOCS/telecommute.html).

3.2. Rural Area Development

"Twenty years ago, "access" in economic development terms meant roads, highways, concrete, and air & rail transportation. Today, access refers to information, data and fiber optics. ICT may mitigate the factor of geography from the economic development equation and make rural areas very accessible and attractive to expanding businesses. Unique applications of telecommunications may ensure that jobs are available in all areas, especially rural areas, and stop serious tendencies towards emigration. Telecommuting is being viewed as a means to provide a new way of establishing an economic base in rural areas by providing a mechanism to funnel work into areas of high unemployment. To the extent that telecommuting makes more jobs more accessible to economically depressed regions, it may help reduce the social tensions of poverty and unemployment" (http://ntl.bts.gov/DOCS/telecommute.html).

4. IMPACTS OF TELECOMMUTING ON TRANSPORTATION SYSTEMS AND TRAVEL BEHAVIOR

"Potential beneficial transportation impacts of telecommuting include reduction in highway congestion and associated lost time, reduced emission of pollutants, savings in energy and petroleum consumption, and fewer highway accidents. Telecommuting is already widely seen as a potentially valuable travel demand management measure to reduce congestion and meet existing ambitious national air quality goals. The projections of numbers of telecommuters were combined with current travel-related statistics to develop estimates of transportation impacts over the next 10 years for the upper and lower bound scenarios. The results suggest that substantial benefits could be attainable by the end of this decade. These projections make clear that telecommuting could eventually play a significant role in addressing problems of urban congestion, safety, air quality, and energy use, but also indicate that it is neither a near-term nor complete solution to these concerns. However, the actual amount and impact of telecommuting in any particular region will depend strongly on travel demand management measures in place and other aspects of the local transportation environment" (http://ntl.bts.gov/DOCS/telecommute.html).

Telecommuting can effect travel and travel behaviour in different ways. For example, telecommuting can reduce commute trips and change travel times. Because teleworkers have the maximum freedom to select travel times, there is a decline in traffic and reduction in congestion during peak hours (Hong, 2002).

"The approach described above indirectly assumes that the only effect of telecommuting is to eliminate work trips and associated vehicle miles travelled. This assumption clearly is not strictly true, since total travel behavior of the telecommuters is likely to change in response to their new situation and flexibility. In some cases these effects could potentially be comparable in magnitude to the direct results of telecommuting. Full understanding of the impact of these effects will come only as telecommuting becomes more widespread and further research is conducted. However, initial findings from pilot telecommuting programs suggest that their impact may be small. Hartman and colleagues report: "It has only been within the past five years that a variety of telecommuting programs, mainly in the public sector, have offered the opportunity to test some of these hypotheses empirically. Transportation evaluations have been completed or are in progress for programs involving the Southern California Association of Governments, the state of California, the Hawaii Telework Center, the Netherlands Ministry of Transport, Puget Sound multi-employer program, Los Angeles County, and several other employers in Southern California. From these programs, several findings are beginning to emerge:

- Commute travel is reduced;
- Non-commute trips do not increase;
- Telecommuters make proportionally fewer linked trips;
- Telecommuters tend to shift activities to destinations closer to home;
- Proportionally fewer peak period trips are made when telecommuting; and
- Evidence regarding the impact of telecommuting on residential relocation is mixed"(http://ntl.bts.gov/DOCS/telecommute.html).

However, Salomon, Mokhtarian and other experts in this field note that forecasts of the adoption of telework and its ability to reduce transport demand tend to be over-optimistic. The evident appeal of telework as a solution for transport problems in congested areas is responsible, in a large extent, for this upward bias. Salomon (1998) also underlines another factor influencing over-optimistic forecasts. These forecasts just pay attention to the technological possibilities and ignore the behavioural aspects. He says, "To date, many of the overly-optimistic forecasts are based on technological deterministic views. These assume a primitive human being who adopts a technology if it is readily available, and if it "solves a problem", presumably at reasonable costs. This uni-dimensional human being does not exist."
The travel behaviour of non-teleworkers may influence the final impact too. If the reduction in congestion due to telework attracts new vehicles, the aggregate effect will be zero. Such limitations of the effectiveness in reducing transport are not an exclusive problem of telework. Any measure that alleviates congestion can generate new traffic. The only solution is to integrate telework in the framework of a global strategy for sustainable transport in a given area (European Commission, 2001).
The other two studies present the results of modelling exercises, assuming a considerable number of hypotheses. Most of the studies are primarily focused on the effects on road traffic. Effects on modal split are not normally considered. Only one of them deals with effects on reducing congestion in public transport modes. Impacts of eight telecommuting pilot projects in the USA and the Netherlands. Mokhtarian, Handy, and Salomon (1998) Mokhtarian, Handy, and Salomon (1995) analyse in detail the impacts on travel, energy use, and air quality of eight telecommuting pilot projects (four of them in California, three in other places of the USA and one in the Netherlands). The studies use different methodologies (European Commission, 2001).

5.IMPACTS OF TELECOMMUTING ON ENVIRONMENTAL SUSTAINABILITY

Sustainable development is 'development which meets the needs of the present without compromising the ability of future generations to meet their own needs' (Dicken, 1998).
Deakin(2001) has stated that, today, sustainable development is widely viewed as development that improves the standard of living and quality of life, while at the same time protecting and enhancing the natural environment and honoring local culture and history. Efforts are being made all over the world to increase the sustainability of development patterns.

The development of ICT has the potential for making major contributions towards sustainability of the earth's ecosystems. Innovative use of information technology offers substitutes for travel and for the transportation of goods, and a major shift towards less resource-intensive production, consumption, trade, and services. Such changes can significantly reduce the environmental impact of industrial and commercial activities and thus contribute to sustainable development (http://static.teriin.org/discussion/environ/itsust.htm).
"In developed nations, special attention is being given to the sustainability of current and emerging land use and transportation patterns. This focus reflects both the significant impacts that current patterns of transportation have on the environment and the complex interactions between transportation, land use, and activity systems. In this context, sustainable transportation is seen as transportation that meets mobility needs while also preserving and enhancing human and ecosystem health, economic progress, and social justice now and for the future. Planning for sustainable development aims to attain all three objectives simultaneously and in a just manner, considering access as well as mobility in the process. Telecommunications substitutions for travel also can be considered a form of demand management. Telecommuting, teleshopping, teleconferencing, and distance learning are varieties of telecommunications substitutes for travel " (Deakin, 2001).
In addition, Deakin emphasized that land use and urban development strategies alter demand by reducing trip length (by providing a choice of close-by destinations) or by making alternatives to the auto more competitive and cost-effective. (These strategies also may reduce emissions associated with building heating and cooling, service provision, etc.) For example, compact development, mixed use development, and higher development densities can reduce trip lengths and make transit, pedestrian, and bike use practical and affordable. In some cases, compact development also may facilitate better management of urban freight transport (shipment consolidation, delivery scheduling, etc.).

Information and telecommunication technologies have a potential to displace trips. This does have clear environmental benefits, particularly when teleworking is substituting for a long commute. Nevertheless, it appears that rather than absolute displacement, telecommunications are simply taking a larger share of increases in all forms of communications. If the amount of communications was to remain stable and electronic forms of communication took an increasing share, then absolute displacement would take place. But if all forms of communications increase absolutely then little displacement effect takes place. According to Grubler, telecommunications and travel have increased in parallel and are not currently substituting for each other. Long run analyses of the relationship between telecommunications and travel have found little evidence of a substitution effect and instead they argue that `due to the diffusion of new telecommunications technologies there will be no reduction in passenger travel, instead considerable growth is likely to occur' (Grubler, 1989).

According to Quay, environmentally, telecommuting is claimed to offer benefits by reducing travel and, consequently, oil consumption and pollution. Even if only 20% of the currently commuting work force were able to telecommute on average for 2.5 days per week, work trips would be reduced by 10% (Quay, 1995). The 11% of the workforce of metropolitan Phoenix-about 100.000 workers-who were telecommuting one day a week in 1993 resulted in saving of 1.8 million miles of travel daily, and if 5% of Los Angeles commuters worked home one day a week, it has been estimated that they would save 9.5 million gallons of petrol and reduce atmospheric pollution by 94 million tons a year(PS Enterprises, 1995-http://www.com/user/pse/telecom.htm). Lake(1997) has argued that, in the intersts of sustainability, public policy should;

- integrate information technology into transport policies,
- give incentives to new ways of working that reduce travel,
- run awareness campaigns on teleworking,
- set an example with all government offices implementing teleworking schemes with annual targets for trip reduction.

"British Telecom has predicted that by the year 2000 3.3 million people, around 17% of the workforce, will be encouraged, the British Road Federation believes, by gridlock arising from the lack of new road building, a trend reinforced by the government's environmental policy. By 2010 it is predicted that journeys to work and shop will have been reduced by 43% and social journeys by 20%, but this contrast with Department of Transport predictions of traffic more than doubling by 2020" (Graham, 1998).

According to another viewpoint, electronic-physical interactions are much more complex than the simple substitutionist view. Empirical assessments of the environmental role of substitution are extremely complex and contingent on the particular locations and contexts where experiments have taken place. For instance, many Californian telecommuting initiatives have an explicitly environmental set of objectives designed to improve air quality. A legislative framework ensures that companies have to meet targets to reduce physical movement and teleworking is promoted as an electronic alternative (State of California, 1990). But teleworking has environmental benefits in this particular context partly because the commutes to work are so long.

Because the length of commutes is lower the energy savings were relatively low, particularly when compared to the increased demands for heating and powering the home (British Telecom, 1992). Marvin (1998) has argued that, decentralization of work also created new difficulties with the recycling of products that is much more feasible in centralized offices. While working from home may save commute trips it can also allow workers to live further away, resulting in a longer trip when workers do need to be at the workplace. The time saved through not commuting may also create the potential or desire for other trips that might previously have not taken place or been combined with the commute to work. According to him, for these reasons the substitution perspective is not as simple as previously supposed.

6. CONCLUSION

Relations between ICT and the urban environment are much more complex and contradictory than is often assumed. Rather than simply substituting electronic for physical flows, telecommunications technologies have a number of effects which can lead to demands for new physical spaces, generate new physical flows and increase the effective capacity of infrastructure networks. Consequently it is not possible to make any simple assessment of the environmental role of telecommunications. Where does this leave us? Is it possible to define a role for telecommunications in environmental policy? While there does appear to be dematerialization effects in the production of manufactured goods, there are contradictory trends around demands for increased mobility. Telecommunications technologies are firmly implicated in both sets of changes, simultaneously increasing the efficiency of production processes and reducing the need for material inputs, while allowing physical spaces and flows to be reconstituted generating environmental problems through dispersal, generation and enhancement of travel. Urban environmental policy needs to develop a new conceptual framework that starts to include the conflicting and complex role of telecommunications. Without such changes researchers and policy-makers will fail to develop a more complete understanding of urban environmental problems or develop relevant policy responses (Marvin, 1998).

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HISTORICAL DEVELOPMENT OF THE MERIC RIVER DELTA: FROM 16TH CENTURY TO PRESENT

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This study focuses mainly on the historical development of the Meric River Delta from 16th century to present. The morphological structures of the Meric River and its delta have changed for years due to the sedimentation occurred especially at the lower water discharge condition. In this paper, these changes are presented through historical maps prepared in the 16th, 19th and 20th centuries and current satellite data. Satellite data used in the study contains Landsat TM and ETM images acquired in 1987 and 2001. In the image processing step, satellite images were geometrically corrected by using topographic maps. The historical maps and treated current satellite images were comparatively analyzed and interpreted. The results show that very significant and remarkable morphologic changes were occurred at the Meric River and its delta from 16th century.

Keywords*: The Meric River, historical maps, satellite image, Landsat, image processing.*

Introduction

The potential of remote sensing is very high for the monitoring of the Earth and the detection of its environmental changes (O'Hara et al., 2003; Xiao et al., 2002). Therefore, remotely sensed images have been used in many fields as a reliable and valuable data source for monitoring land-cover changes, visual interpretation of coastal areas and determination of coastline changes at regional and global scale (Üstün et al., 2003). The use of remote sensing makes it much easier to reach accurate and actual data than any other acquisition technique. Because of that, such systems gain importance for the engineering applications and for modeling natural hazards and also for performing different types of analysis related with the detection of the coastal zone (Meza Diaz and Blackburn, 2003; White and El-Asmar, 1999).

The Meric River originates from the Rila Mountains in Bulgaria, forms a part of the border between Greece and Turkey and flows into the Aegean Sea through Enez region in the Meric River Delta. The morphological structures of the Meric River and its Delta have changed for years due to the sedimentation occurred especially at the lower water discharge condition (Ekercin, 2000; Örmeci and Ekercin, 2006). In this study, this changing was analyzed by using historical maps prepared in the 16th, 19th, 20th centuries and multitemporal satellite remote sensing data.

The main purpose of this paper is to investigate and present the temporal change of Meric River Delta and its vicinity with the help of historical maps and current remote sensing data which can be used for detection of changes on coastal areas.

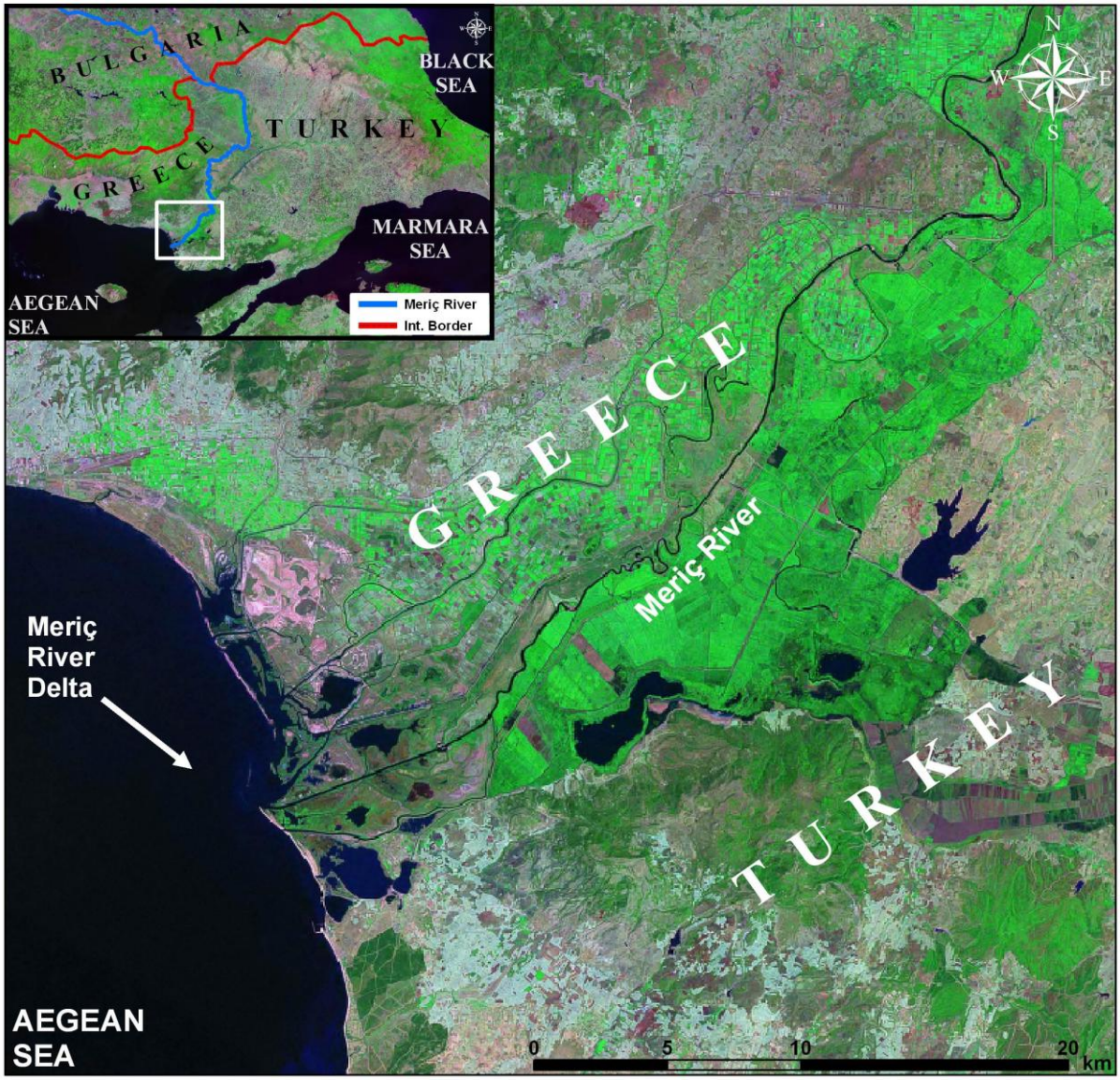

Figure 1. Presentation of the study area with the Landsat-7 ETM, 2001 image data.

Study Area

The Meric River originates from the Rila Mountains in Bulgaria, forms a part of the border between Greece and Turkey and flows into the Aegean Sea through Enez region in the Meric River Delta. The study area is located between 25° 55′ and 26° 14′ E and 40° 42′ and 40° 56′ N, and covers an area of 25 km by 27 km in the south-eastern Balkans.

Material

Satellite remote sensing data used in this study contains a subscene of Landsat-7 ETM (Enhanced Thematic Mapper) and Landsat-5 TM (Thematic Mapper) multispectral data acquired on August 20, 2001 and on July 02, 1987 respectively (Path: 182; Row: 32). ERDAS Imagine software was used to process satellite data.

The topographic data, produced by the National Mapping Agency of Turkey, were 13 maps at the scale of 1:25 000. These types of maps are the most common and sometimes the "only" cartographic source to cover such frontier zones (Toutin, 2003). Additionally, in order to analyse the effects of sedimentation at the Meric River Delta and its vicinity, some historical maps having different scale were used in the study. These maps were presented by Gocmen (1976) as the result of PhD thesis completed in University of Istanbul, Turkey.

Geometric Correction

The quarter of Landsat-ETM, 2001 scene was rectified using a set of 40 ground control points (GCPs) extracted from 1:50.000 scale maps. At first step ground control point coordinates were digitized from the topographic maps with standard scale 1:50.000. The quarter of Landsat-TM, 1987 scene was then rectified using image-to-image registration process with the help of 40 ground control points (GCPs). Geometric correction was carried out by using first order polynomial equation. Than at the last step of the geometric correction process, the nearest neighbour resampling method was used with root mean square (RMS) error less than ±0.5 pixel. In order to preserve radiometric integrity, a nearest neighbour interpolation method was used (Almeida-Filho and Shimabukuro, 2002).

Results and Discussion

The results show that the morphological structures of the Meric River and its delta have changed for years. The Meric Delta has accreted toward the Aegean Sea due to sediment discharge and transport which occur especially at the lower water discharge condition. In this paper, this changing was visually and comparatively interpreted by using historical maps and current satellite remote sensing data.

Figure 2 (a) presents a historical map produced by *Pírí Reis* in 1526 and published in his book, namely *Kitab-i Bahrieh*. *Pírí Reis* (full name Hadji Muhiddin Piri Ibn Hadji Mehmed about 1465-1555) was an Ottoman admiral and cartographer born 1465 in Gallipoli on the Dardanelles. He is known today for his maps and charts collected in his *Kitab-i Bahrieh* (*Book of the Navy*), a book about the Mediterranean Sea. He gained fame as a cartographer when a small part of his world map (prepared in 1513) was discovered in 1929 in Istanbul. The most surprising aspect was the presence of the Americas on an Ottoman map, making it the first Turkish map ever drawn of the western coastlines of America (Wikipedia, 2006). On the other hand, Figure 2 (b) gives information about the present condition of the Meric River and its delta through the near infrared band of Landsat-7 ETM, 2001 satellite data.

As summary, the comparison of figure 2 (a) and (b) reveals significant coastal changes occurred at the Meric River and its environment for a 475-year period (1526-2001) due to sediment transport and deposit.

Figure 3 makes comparison satellite image data with the historical maps from 19th century. The first historical map shown in figure 3 (a) is a French map showing the northern part of the Aegean Sea. It was produced in 1854 (Carte de la Partie Septentrionale de l'Archipel. Publiée: par ordre de l'Empereur M.T. Ducos, 1854). The second map presented in figure 3 (b) was produced at the scale of 1: 250 000 by Heinrich Kiepert in 1890 (Specialkarte vom Westlichen Kleinasien. Heinrich Kiepert, Berlin, 1/250 000, 1890).

By comparing the historical maps (produced in 1854 and 1890) mentioned above with the near infrared band of Landsat-7 ETM, 2001 satellite data (figure 3 (c)), it can be easily seen the coastal areas change occurred. These changes are dramatically apparent especially around

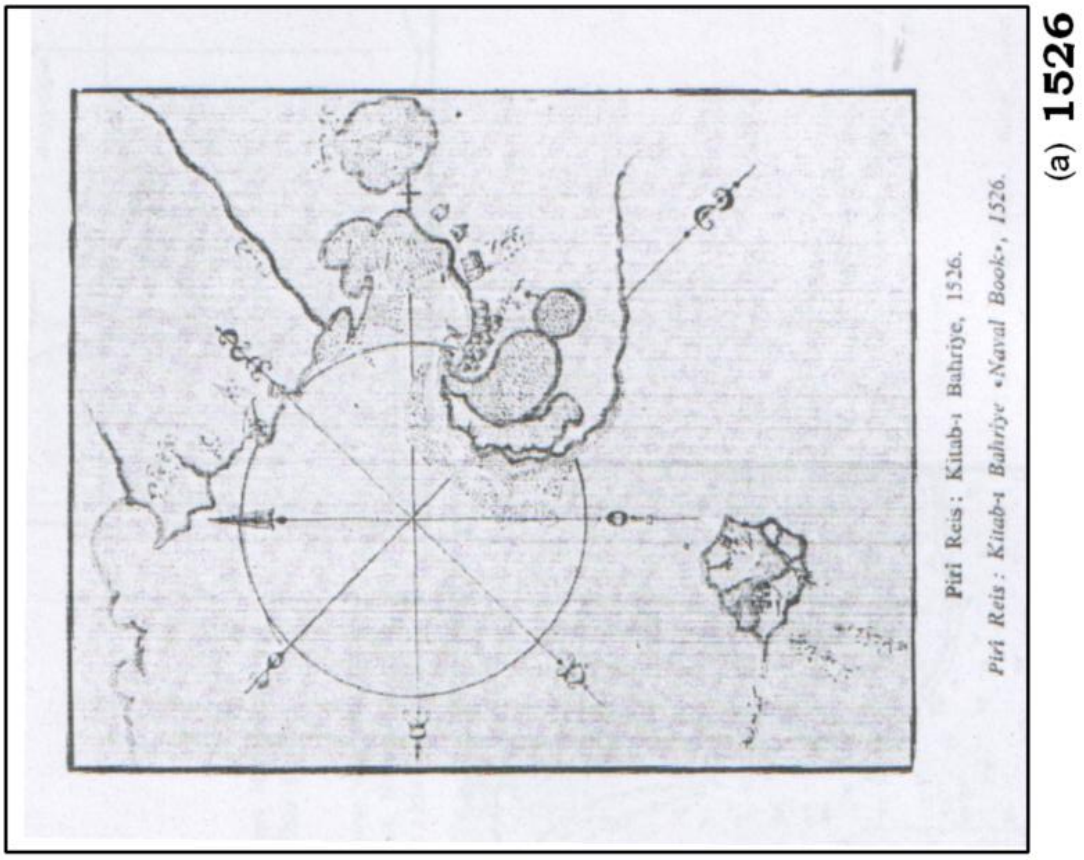

Figure 2. Presentation of the morphological changes occurred at the Meric River and its delta by using historical map and satellite image data (please see the paper contents for more information about the map, Piri Reis-1945).

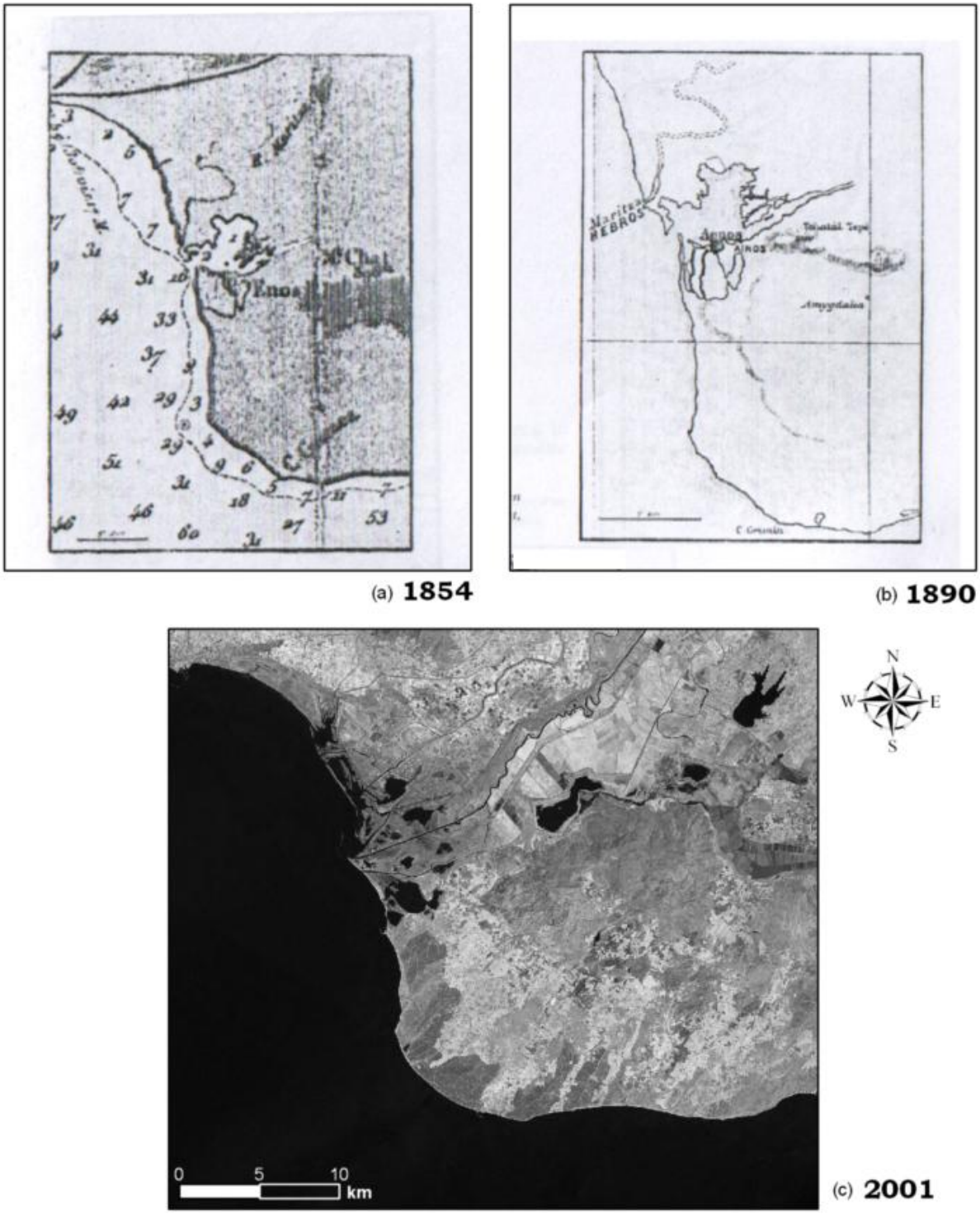

Figure 3. Presentation of the accretion at the Meric River Delta using historical maps and Landsat-7 ETM, 2001 image data.

the Meric River Delta (Figure 3). The most important factor leading these morphologic changes is sediment transport and deposit which occur especially at the lower water discharge condition of the Meric River.

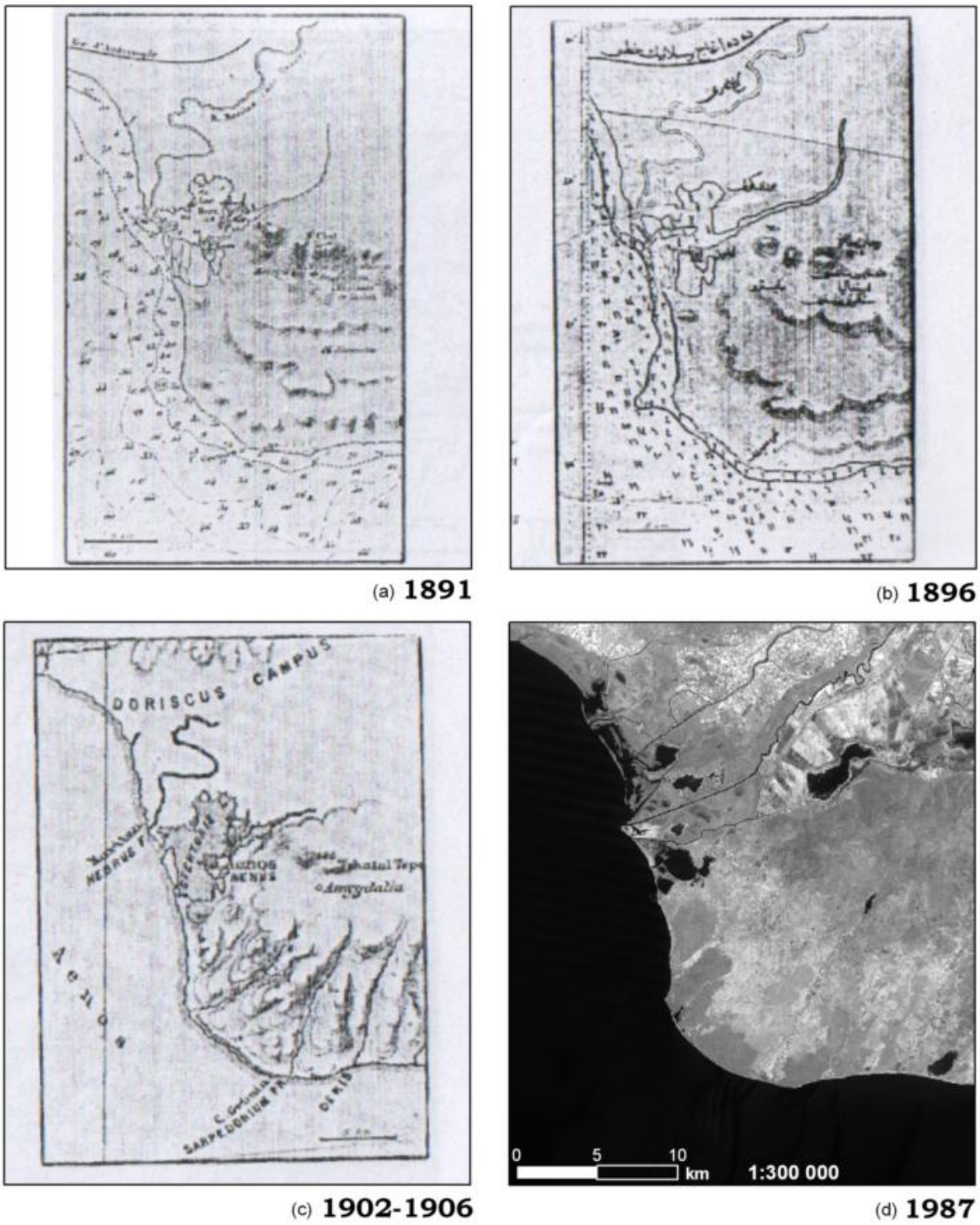

Figure 4. Presentation of the accretion at the Meric River Delta through the historical maps and the near infrared band of Landsat-5 TM, 1987 image data.

Figure 4 presents some historical maps produced between 1891 and 1906. The map shown in figure 4 (a) was produced by the French Sea and Hydrographical Service in 1891 (Mer Mėditerraniėe. Partie Nord de l'Archipel du Golj de Ruphani a l'entriėe des Dardanelles.

Service Hydrographique de la Marine, Pafta 4596, 1/270 000, 1891). The map shown in

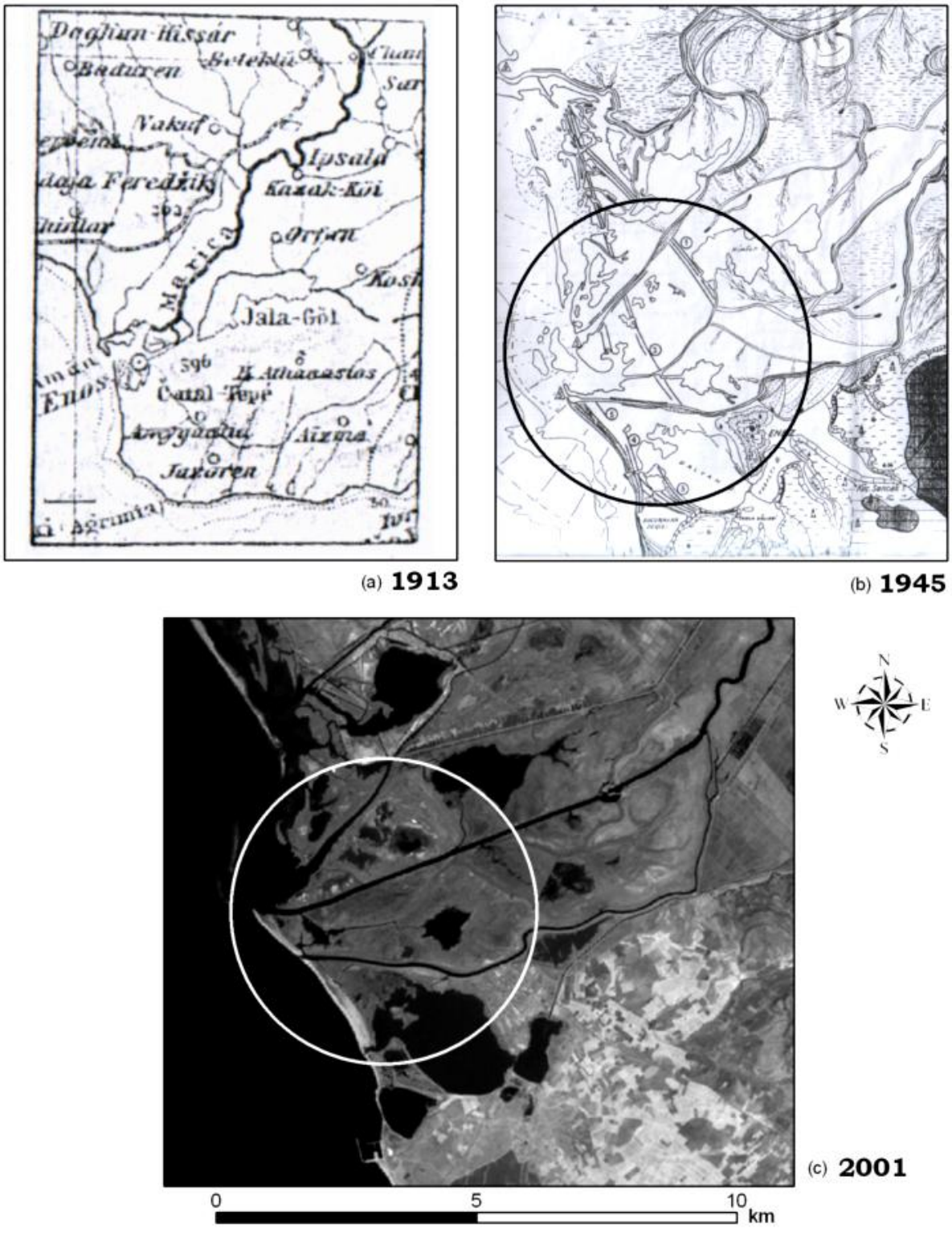

Figure 5. Analyzing the morphological changes around the Meric River Delta using historical maps and Landsat-7 ETM, 2001 image data.

figure 4 (b) was produced in 1896 (Marmara Sea-1896 Sounding Map, Soundings In Fathoms). The last map shown in figure 4 (c) was produced by Richard Kiepert in 1902-1906 (Karie von Kleinasien. Richard Kiepert, 1/400 000, Berlin, 1902-1906). The comparison of these maps with the current satellite image data clearly indicates changing occurred around the Meric River Delta (Figure 4).

Figure 5 presents some historical maps from relatively near history (XX. century). The map shown in figure 5 (a) was produced by Paul Longhans in 1913 (Die neuen Grenzen des Königreichs Bulgarien gegen Rumanien, Serbian und Griechenland. II Tafel 54, Prof. Paul Longhans, 1/500 000, 1913). The geomorphological map (1945) presented in figure 5 (b) was produced by Gocmen (1976) as the result of PhD thesis completed in University of Istanbul, Turkey. By comparing the historical maps (produced in 1913 and 1945) with the near infrared band of Landsat-7 ETM, 2001 satellite data (figure 5 (c)), it can be easily seen the morphological changes occurred around the Meric River Delta.

Conclusions

In this paper, temporal change of Meric River Delta and its vicinity has been presented with the help of historical maps and current remote sensing data which can be used for detection of changes on coastal areas.

The results of this study demonstrate that coastal movements such as erosion and deposition have caused the morphological changes at the northeast coasts of the Aegean Sea. Coastal accretion is dramatically apparent at the Meric River Delta due to sediment deposition.

Landsat TM and ETM images for the years 1987 and 2001 served quite well in detecting the remarkable coastal changes within years.

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MULTITEMPORAL CHANGE DETECTION AT THE SALT LAKE IN TURKEY USING REAL-TIME SPOT IMAGERY AND IN-SITU SPECTRAL MEASUREMENTS

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This paper presents an assessment of multitemporal changes at the Salt Lake by using satellite remote sensing data. Satellite remote sensing data including SPOT-1 (17.05.1987) and SPOT-4 (17.05.2005) are evaluated with in-situ measurements collected during the simultaneously performed field work. In the image processing step, firstly satellites images are registered to a common coordinate system in order to be evaluated together. After that, radiometric correction procedure including conversion from DNs (Digital Numbers) to radiance and from radiance to ground surface reflectance is conducted to make satellite data comparable with in-situ measurements. The evaluation of real-time ground and satellite data shows that they are highly correlated with the R^2 value of about 0.90. The result of this process also demonstrates that only the near infrared band can be used for determination of water covered area in the Salt Lake, Turkey. The interpretation of the near infrared bands of multitemporal SPOT images shows that water surface area in the lake has decreased from 92 562 ha (1987) to 32 552 ha (2005) with a ratio of about 30% for an 18-year period.

Keywords: *The Salt Lake, satellite remote sensing, multitemporal SPOT image, radiometric correction.*

Introduction

The Salt Lake is an important natural resource and the second largest lake in Turkey with an area (including special protected area) of 6274.64 km^2 (Ormeci and Ekercin, 2006; OCKKB, 2006). The region has been experiencing drought over the last two decades resulting from uncontrolled use of underground water resources for agricultural purposes and the lack of precipitation (or natural drought).

The aim of this study is to investigate the water reserve change at the Salt Lake and its vicinity by examining multitemporal satellite remote sensing data. For this purpose, multitemporal SPOT image data were geometrically corrected as first stage in the study. After the radiometric correction process, water reserve change at the Salt Lake, Turkey was comparatively analyzed. The interpretation of multitemporal SPOT images shows that water surface area in the lake has decreased from 92 562 ha (1987) to 32 552 ha (2005) with a ratio of about 30% for an 18-year period. The results indicate that the Salt Lake could be faced with drying in the next few decades.

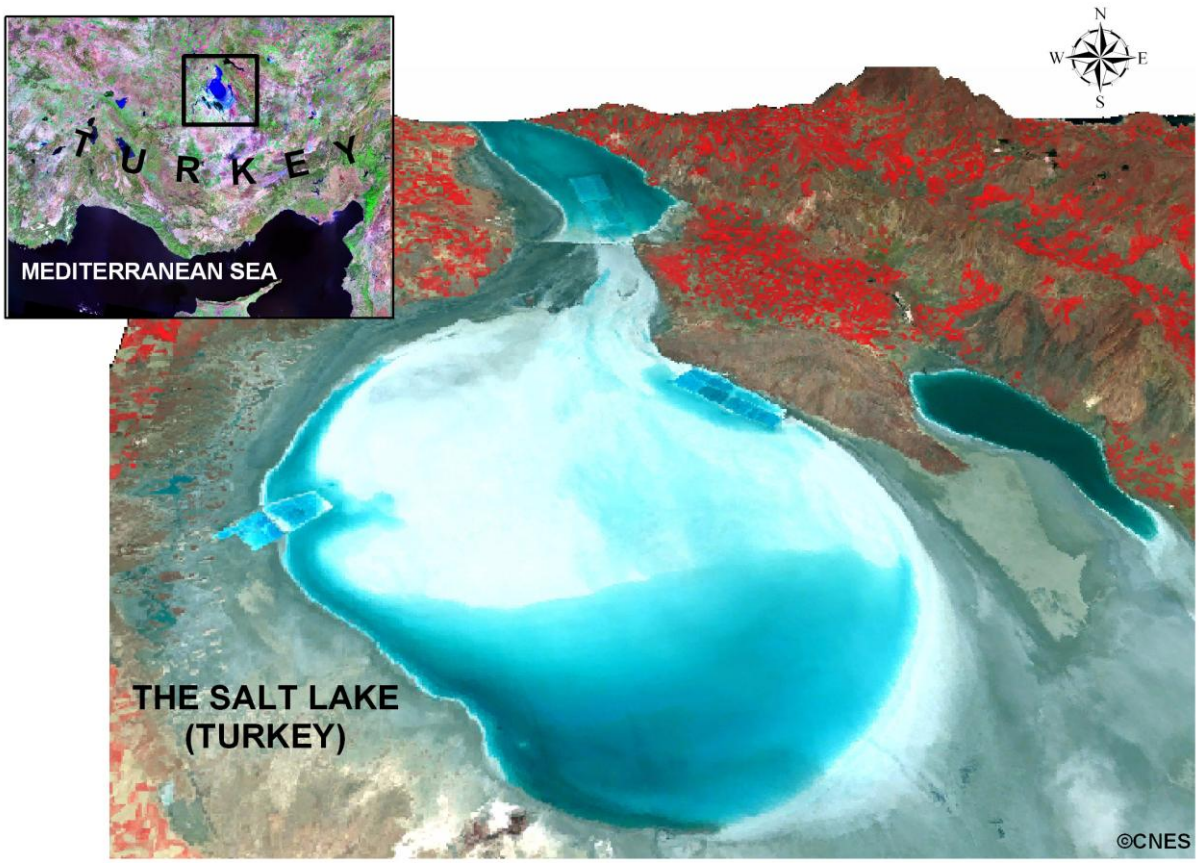

Figure 1. Location of the study area

This paper presents a part of ongoing research project funded by The Centre National d'Etudes Spatiales (CNES) under the OASIS Programme (European Commission) grant number 82.

Study Area and Material

The Salt Lake is the second largest lake in Turkey. It is located between 33° 03′ and 33° 45′ E and between 38° 20′ and 39° 10′ N, and covers an area of 6274.64 km2 in the Central Anatolia, Turkey (figure 1). The Salt Lake occupying a depression in the dry central plateau of Turkey lies at an elevation of 905 m. It is a huge (1,500 km2) and very shallow (with a maximum depth of 1.5 m. in spring) lake and extremely saline with a salt ratio of 32%. The lake bottom is covered with a 1 to 30 cm. thick salt layer, which has given rise to a local salt industry providing 30% of all Turkish salt. The area receives the lowest annual precipitation in Turkey, less than 400 mm/p.a. The lake is fed by two major streams, groundwater and surface water. The lake is surrounded by agricultural fields in the north, east and west (OCKKB, 2006; Ormeci and Ekercin, 2006).

In this study, two SPOT images were used acquired in 1987 and 2005 (Table 1). Field work was performed on May 17, 2005 (between local time 0930- 1230 GMT) simultaneously with the overpass of SPOT-4 respectively. During the field work, an ASD FieldSpec®Pro field portable spectroradiometer and a hand held Magellan GPS receiver were used. Image processing procedure and the evaluation of spectral measurements were carried out using Erdas Imagine© and ASD ViewSpecPro© software packages.

Table 1. Characteristics of the remote sensing data used in the study.

Sensor	Date	Band (µm)	Spatial Resolution (m)	Path/Row
SPOT-1	17.05.1987	1: 0.50-0.59	20	111/272
SPOT-4	17.05.2005	2: 0.61-0.68		
©CNES		3: 0.78-0.89		
		4: 1.58-1.75		

Image Processing

In this stage of the study, geometric and radiometric correction processes were performed. Firstly, satellite remote sensing data were geometrically transformed to real world coordinates using UTM projection and WGS 84 datum. The SPOT scenes covering the study site (acquired on May 17, 1987 and May 17, 2005 respectively) were geometrically corrected. Base maps (1:25 000) and GPS points were used for the ground control, resulting in a RMS accuracy of less than a half pixel utilizing 50 ground control points. In order to preserve radiometric integrity, a nearest neighbour resampling method was used (Hellweger et al., 2004; Lillesand et al. 2004; Almeida-Filho and Shimabukuro, 2002). Due to the small size (2 by 2 km) and flat topography of the study area, a first-order polynomial transformation method was performed to create the output images with 20m ground resolution for SPOT sensor data (Rembold and Maselli, 2004; Wulder, 1997).

As second stage, radiometric correction process was performed to obtain values of spectral reflectance at sample points and to make digital numbers (DN) comparable with the in-situ spectral measurements (Jensen, 2000; Paine et al., 2003; Zhang et al., 2003). For this process, following formulas were used;

Conversion from DNs to radiance:

$$L_\lambda = DN_\lambda / Gain_\lambda \quad (1)$$

Where; $Gain_\lambda$ [units of W/(m^2.sr.µm)/DN] and $Bias_\lambda$ [units of W/(m^2.sr.µm)] are band-specific rescaling factors and given in the header file of satellite data. Calculation of radiance is the main stage to put image into a common radiometric scale.

The next step is used to make the satellite data comparable with the spectral *in-situ* measurements. We used, in this step, the following equation for conversion from radiance to ground surface reflectance

$$R = \frac{\pi . L_\lambda . d^2}{ESUN_\lambda . Cos(\theta_s)} \qquad (2)$$

where;

- R unitless planetary reflectance;
- π a constant (3,141592654)

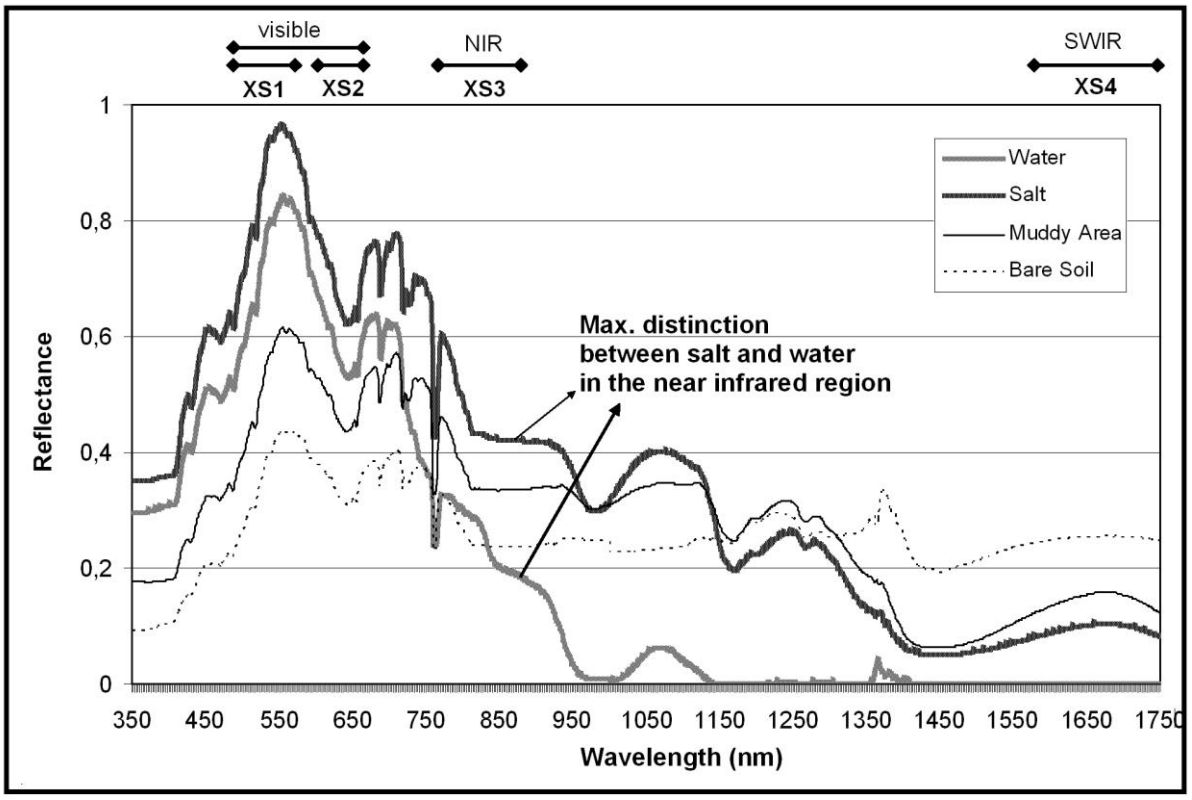

Figure 2. Evaluating the results of in-situ spectral measurements.

- L_λ spectral radiance at the sensor's aperture;
- d earth–sun distance in astronomical units;
- $ESUN_\lambda$ mean solar exoatmospheric irradiances;
- θ_s solar zenith angle in degrees (90°- Sun Elevation).

Results and Discussion

In this study, the correlation between SPOT satellite data and real time in-situ spectral measurements was examined. After that, the most suitable spectral band was investigated for detecting water surface area at the Salt Lake, Turkey by using SPOT image data. Here, it should be pointed out that the natural structure of the lake differs from water regions well known. The water depth is up to 1,5 m (most part is very shallow) and the lake's bottom is covered with salt. This makes the Salt Lake different from common lakes in terms of interpretation of satellite images.

The evaluation of real-time ground and satellite data shows that they are highly correlated with the R^2 value of between 0.88 and 0.97. The result of this process also demonstrates that only the near infrared band can be used for determination of water covered area in the Salt Lake, Turkey (Figure 2).

The interpretation of the near infrared bands of multitemporal SPOT images shows that water surface area in the lake has decreased from 92 562 ha (1987) to 32 552 ha (2005) with a ratio of about 30% for an 18-year period. Figure 3 presents the near infrared band of multitemporal SPOT images collected on the same day and hours and indicates the general overview of water reserve change at the Salt Lake, Turkey.

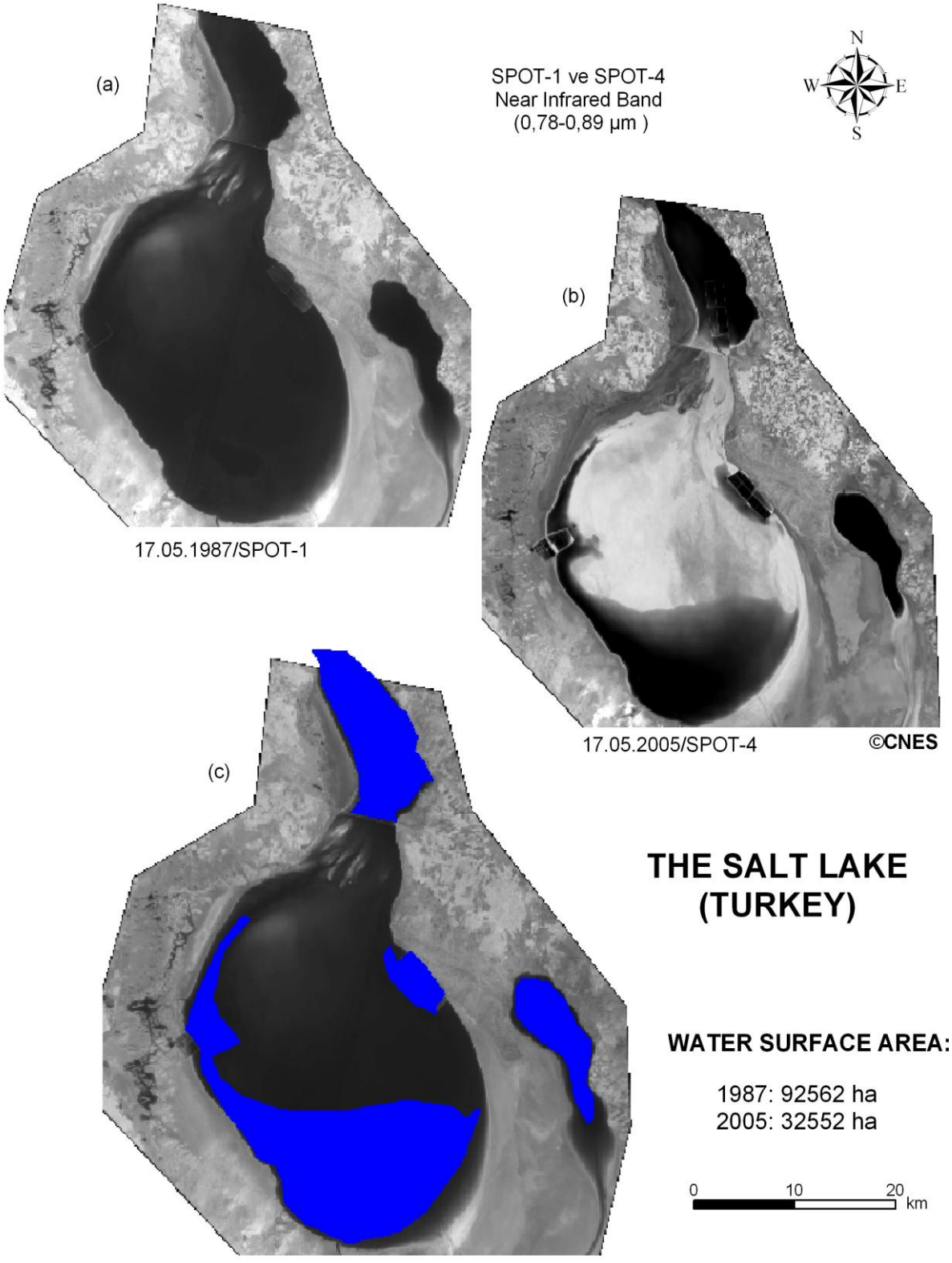

Figure 3. Detecting water reserve change in the Salt Lake, Turkey using multitemporal SPOT image data.

The most important factor effecting the water reserve change is the uncontrolled use of underground water as water supply for cultivation. Underground water is the biggest component among the water inputs feeds the lake (Figure 4). It is, may be, only one

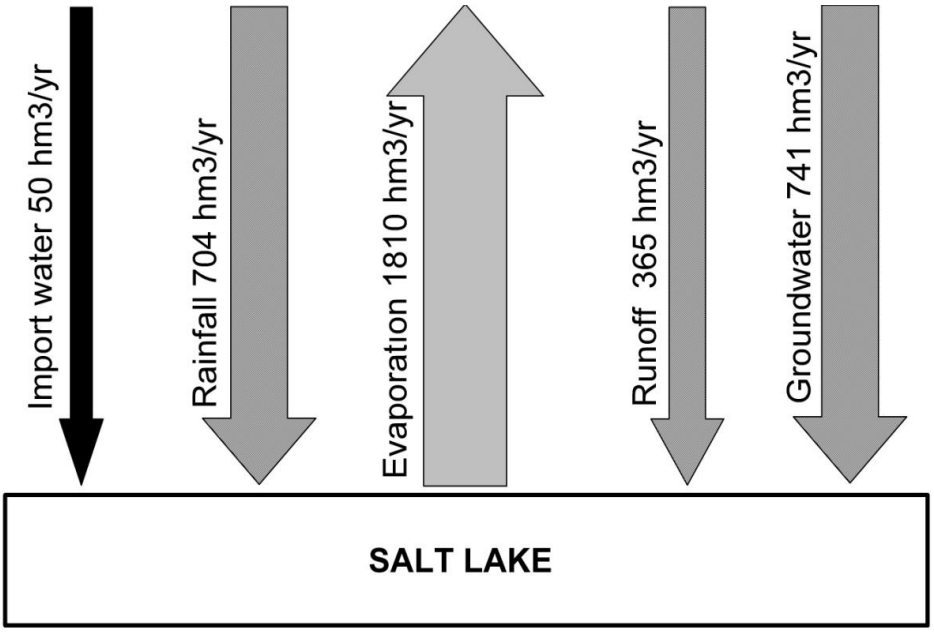

Figure 4. Summarizing water inputs and evaporation in the Salt Lake, Turkey (OCKKB, 2001)

source which can be prevented among the water inputs. Therefore, the region urgently needs an application project planed for regulating use of underground water for agricultural activities. This project should also constitute an essential base data for the determination of the management strategy aiming the control of the desertification occurred in the Salt Lake and its vicinity.

Conclusions

In this paper, we have presented an assessment of multitemporal change of water reserve in the Salt Lake. This study is the first one involving spectral measurements in this study area and gives valuable information for evaluation of satellite images acquired over the Salt Lake and similar regions in terms of natural structure.

The spectral band sensed only in the near infrared region such as Landsat TM4 is favourable for distinguishing salt and water in the Salt Lake which has salt covered bottom. This plays key role for determining multitemporal water reserve change by using satellite remote sensing data.

The results of multitemporal analysis show that water reserve in the Salt Lake, Turkey has strikingly decreased from 92 562 ha (1987) to 32 552 ha (2005) with a ratio of about 30% for an 18-year period.

This study shows that satellite imagery provides an essential tool in determining drought impact due to the operational acquisition of satellite imagery.

Acknowledgement
The funding for SPOT data used in this study comes from the Centre National d'Etudes Spatiales (CNES) under the OASIS Programme grant number 82. The authors appreciate the support provided by the European Commission.

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AN INTELLIGENT SYSTEM FOR INTEGRATED SOLID WASTE MANAGEMENT

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Landfilling is essential for the disposal of municipal solid wastes but every landfill has its own finite capacity. The most common way to extend the life of landfills is to implement integrated solid waste management, by introducing recycling, composting, and incineration technology into the solid waste management system. The selection of solid waste technology is the process of choosing suitable technology that can reduce the amount of solid waste to be disposed at a landfill site, and thus it can make the life span of the landfill longer. This process is complicated and must consider various factors in the decision making. Since integrated solid waste management is somewhat complicated, time-consuming and tedious, as well as the scarcity of experts in Malaysia, there are some efforts to develop an expert system for selecting and designing solid waste technology, known as *UrusSisa*. Expert system is an interactive computer programs that mimic the decision making and reasoning processes of human experts in solving a specific complex problem, by providing expert advice, answering questions, and justifying their conclusions The purposes of developing *UrusSisa* were to improve the process of selecting the best solid waste technology, and to make the knowledge of preliminary design of solid waste technology available to municipalities and other decision maker. Knowledge based of *UrusSisa* consists of two important parts, namely priority ranking of solid waste technology using Analytical Hierarchy Process (AHP), and preliminary design of recommendation technology. AHP is an approach to decision making that involves structuring multiple choice criteria into a hierarchy, assessing the relative importance of these criteria, comparing alternatives for each criterion, and determining an overall ranking of the alternatives. Preliminary design of solid waste technology includes preliminary design for recycling, composting, incineration, and sanitary landfill. The performance of prototype has been tested by using case study.

1. Introduction

Solid waste can be classified as unwanted materials left over from manufacturing process, or refuse from places of human habitation. Solid waste management is an integral part of urban and environmental management of each city. In developing countries, these services fall short from the desired level as the system being adopted are outdated and inefficient. Extremely low priority is given to the area of waste handling and disposal resulting in budgetary limitations and weak infrastructure to handle one of the most important problems in most urban areas.

The total amount of solid waste generated in Malaysia was about 16,000 tons per day with the average per capita generation rate of about 0.88 kg/day (Ministry of Housing and Local Government 2002). The amount generated is expected to increase due to rapid economic and population growth. At present, landfilling is the only method for disposal and most of these landfill sites are open dumps which is nearly full. To develop a new landfill site is difficult because of land scarcity and increasing of land prices especially in urban areas.

Today, an integrated solid waste management requires a more formal structure of facilities and political actions, not only within the community but also the state and federal governments. Armed with technical and economic resources, managers of solid waste system must integrate of all aspects solid waste management activities, from generation through disposal. Therefore, Integrated Solid Waste Management Program has been developed in Malaysia to divert municipal solid waste from disposal sites.

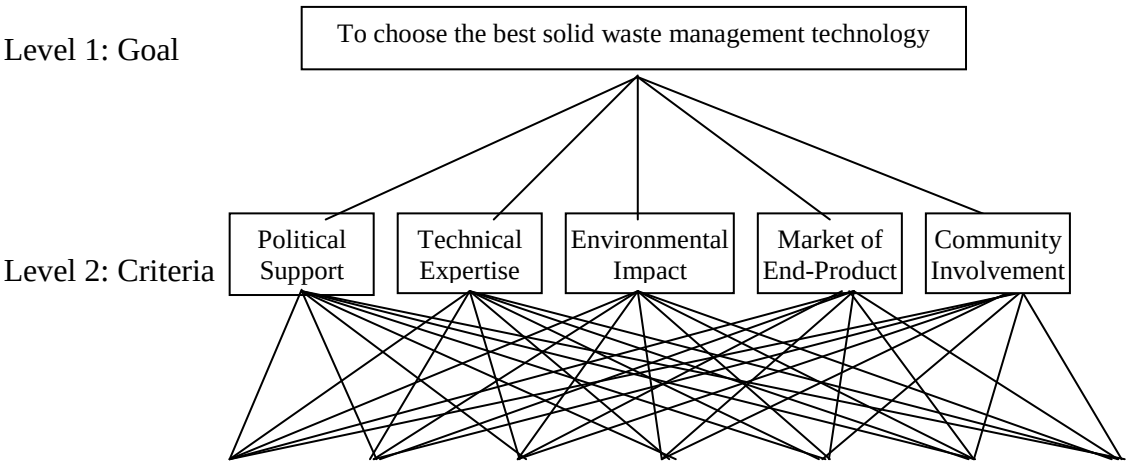
2. Analytical Hierarchy Process in Solid Waste Management

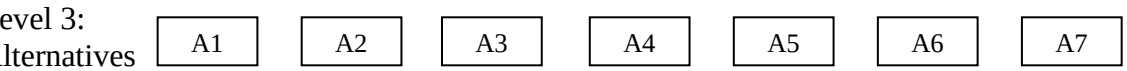
Analytical Hierarchy Process (AHP) is amongst the most well known methods of Multi Criteria Decision Making, introduced by Saaty (1980). AHP can be defined as a hierarchical analysis methodology supporting rational decision making by simplifying a complicated problem (Saaty 1995).

Decision making in solid waste management involved a complex problems. Both tangible and intangible criteria need to be prioritized in a decision making process. Intangible criteria such as political and social factors take precedence over tangibles criteria such as economic and technical factors. AHP is methods that improve the understanding of complex decisions by decomposing the problem in a hierarchical structure. The incorporation of all relevant decision criteria, and their pair wise comparison allows the decision maker to determine the trade-offs among objectives.

A major strength of AHP is the pairwise comparison where the influence of the elements of a particular level over those of a lower level is measured. The comparison is based on an expert's opinion and experience gained from the observation and continuous learning of system behavior. Other advantage of AHP is that it has the ability to checking the consistency of judgments. This consistency ratio is important to ensure the judgments were consistent and that the final decision is made well.

The AHP is based on three principles: decomposition of the decision problem; comparative judgments of the elements; and synthesis of the priorities. The first step is to structure the decisions of the problem in a hierarchy (Fig. 1). The goal of the decision, "to choose the best technology for solid waste management", is at the top level of the hierarchy. The next level consists of the criteria relevant for this goal and at the bottom level are the alternatives to be evaluated.





where:

A1 : Recycling
A2 : Composting
A3 : Incineration
A4 : Combinations of recycling + composting
A5 : Combinations of recycling + incineration
A6 : Combinations of composting + incineration
A7 : Combinations of recycling + composting + incineration

Figure 1 Hierarchy structure of solid waste management technology

The second step is the pairwise comparison between elements in structural hierarchy. For this relative comparison, the fundamental scale is as in Table 1 can be used. It allows expressing the comparisons in verbal terms, which are then translated to the corresponding numbers.

Table 1 Fundamental scale for pair wise comparison

Verbal Scale	**Numerical Scale**
Equally important, likely or preferred	1
Moderately more important, likely or preferred	3
Strongly more important, likely or preferred	5
Very strongly more important, likely or preferred	7
Extremely more important, likely or preferred	9
Intermediate values to reflect compromise	2, 4, 6, 8

In the third step, the comparisons are being synthesized to get the priorities of the alternatives with respect to each criterion and the weights of each criterion with respect to the goal. The validity of pairing comparisons outcome is obtained by checking consistency, in which the consistency ratio is less than 0.1 can be accepted. However, if the consistency ratio is more than 0.1, the pairwise comparison needs to be reevaluated. The consistency ratio is considered important as it indirectly able to control bias evaluation made by the domain expert that may inclined towards their own respective experiences, during the process of pair wise comparison. This is mainly due to expert's background in certain areas may highly influence the evaluation process. Even though there are some differences made by the experts, the consistency value that is less than 0.1 can be accepted.

2.1 Criteria in decision making

To extend the life span of landfills sites, the reduction of amount of wastes to be disposed off is crucial. Solid waste diversion could be implemented by technologies such as recycling, composting or incineration. The effectiveness of these technologies depends on many criteria such as political support, technical expertise, environmental impact, market for end-products and community involvement.

1. *Political support*

A political support is important because the final decision to select a technology is very much depended on it. A strong political support will ensure that the chosen technology is acceptable for a long time. Normally, technology selection is indirectly affected by the current political situations, whereby the leader developed their own favourite technologies.

2. *Technical expertise*

Technical expertise is referred to the high level of workers qualifications. Normally incinerator, a higher-end technology, requires workers with higher technical expertise to operate the system. Some waste technologies such as recycling and composting are relatively less complicated process and the requirement of technical expertise is not too critical.

3. *Environmental impact*

Technologies for solid waste management should be able to eliminate or reduce any potential environmental hazard to the environment. Environmental impact is potential to create problem such as public health nuisance and pollution to the environment. As an example, the principal potential negative impacts of a compost operation on the environment would be the lowering of the quality of water and air resources and the compromising of the public health and well being by attracting and breeding vectors and rodents. It should be emphasised that these impacts are potential impacts and that they would become actual only when an inadequate technology or methodology was used, a normally adequate management was improperly applied, and preventive or corrective measures were not taken.

4. *Market of end-product*

Marketability of the end-products is an important criterion to ensure the success of an integrated solid waste management. Various end-products will be generated by solid waste technologies. Valuable materials will be recovered by recycling, compost product is produced by aerobic composting process, methane gas is obtained during anaerobic digestion process and renewable energy is produced by Refuse Derived Fuel (RDF). Marketability of the end-products should be analysed before a technology is to be selected to ensure that there will be demands for the products.

5. *Community involvement*

Community involvement is also considered crucial and should not be denied. There were cases of closing down various waste facilities due to objections from the community surrounding. It was shown that technologies which require intensive community participation such as segregation at source will pose a higher risk of failure especially in most developing countries. Certain technology, for example incineration, requires that the feedstock to be separated well to ensure the process runs smoothly.

2.2 Solid waste management alternatives

A wide variety of alternative programs and technologies are presently available for the management of solid wastes. Due to the large number of participants in a decision-making process, the selection of proper mixture of alternatives technologies has become a more difficult task.

Based on hierarchy of integrated solid waste management, three technologies were chosen as alternatives; they are recycling, composting and incineration. However, sanitary landfill is not considered as an alternative because it must be developed in whatever system being chosen. Landfilling is always required no matter what intermediate treatment process is introduced. Be it incineration, composting, separation or recycling, there will always be residue left that has to be landfilled.

1. *Recycling technology*
   In most developing countries recycling activities are done informally mainly by scavengers at landfill sites. Recycling process started by the collection of valuable waste from waste generators, followed by processing and reprocessing phase. The recyclables are collected from curbsides, drop-off or buy-back centers. Recycling technology is considered important because it able reduce 20 percent of waste that must be disposed off in landfills. There are many benefits offer by recycling technology, such as to save the current exchange, to conserve the nature, to save the energy use, and to reduce the landfill life span. Among the valuable materials to recycle are aluminum, paper and cardboard, plastic, glass, and metal. Recycling is not a new a technology even in Malaysia. The recycling campaign was launched throughout the region in 1993. However the program failed in many regions due to lack of involvement from the public and factories. Therefore, on the 2nd December 2000, the Ministry of Housing and Local Authority re-launched the campaign for the second phase. The date 11th November was selected as the National Recycling Day.

2. *Composting technology*
   Composting is a control process where the organic material was biodegrade by the microorganisms to produce the black and stable compost. Composting process can be done as a passives piles, turned windrow, aerated static piles or in-vessel systems. All the systems have the same biological principles, but they differ by the aeration system. Composting offers many benefits such as to increase diversion rate from the waste disposal areas (50%), compost products for soil amendments, promotion to an environmentally friendly practice and to reduce transportation costs. In Malaysia, composting is a one of the common practice to handle agriculture waste. However, presently there is no application for municipal solid waste, although almost 50 percent of the waste is organic materials.

3. *Incineration technology*
   Incineration is a chemical process where carbon, hydrogen and a few elements mix together with oxygen to produce heat energy. This technology is able to reduce toxicity, reactivity and high volume of waste effectively (can divert 85% of municipal waste from disposal site). However, it is very costly and must be operated by highly technical expertise. The three common incineration technologies available currently are mass burning, refuse-derived fuel and modular systems. Incineration is not a new technology in Malaysia as it is being used to treat hazardous waste as well. However, the implementation of incineration technology to treat municipal solid waste received strong objections from the public mainly due to health and environmental risks, high capital and operation costs and higher risks of technological failure due to the imported technology from abroad that has not been proven successful in the region.

3 Components of UrusSisa Knowledge Base

UrusSisa, prototype of expert system, is designed to aid the development of an effective solid waste management for Malaysia. The prototype was developed by phases; knowledge acquisition process from literature study initially, then interaction with the human experts who posses wide experience in the related areas, and eventually site observations. The knowledge gathered was then codified using an open source programming language (Preprocessor Hypertext – PHP) and MySQL as a database. An internet-based programming language was selected for easy access and usage in various locations worldwide.

The three broad categories of expertise sources were identified and selected to extract the knowledge base for prototype UrusSisa [a] textbooks and manuals; [b] domain experts; and [c] research publications. A complete understanding of the whole domain required a combination of multiple sources of expertise. Furthermore, multiple sources of expertise also important to increase the quality of knowledge base by avoid bias towards a single view, conflicting views manifested by several different experts, and handicapped by availability constraints of any one source of expertise..

The knowledge acquisition process for development prototype UrusSisa could be categorised into three phases:

- **Phase I**
  Text analysis was done in Phase I to extract the contents from 22 textbooks and manuals related to the domain area. An understanding on the concepts, techniques, and the requirements of solid waste management especially recycling, composting and incineration is obtained in this phase. The knowledge extracted was then organized according to their respective tasks and become the foundation of the prototype knowledge base. Any conflicting information was rationalized and resolved.

- **Phase II**
  Phase II included interview sessions with 11 selected human experts and site observations. The acquired knowledge was used to strengthen, improve and expand the knowledge base of the prototype. By this process, the knowledge on solid waste management acquired were adapted to the Malaysian conditions. This is due to the reason that most textual knowledge sources acquired in Phase I were originated from abroad.
  Site observations were done by observing the daily tasks for solid waste management activities. This method is more flexible as it does not take too much of the experts' valuable time, which is done naturally during their daily work.

- **Phase III**
  Phase III involved analysis of recent research publications such as journals and proceedings of conferences. This was done to strengthen, improve and expand the knowledge base by adding the latest findings and experiences.

In general, the UrusSisa architecture consists of two main components; priority ranking of technology using AHP technique, and the preliminary design of solid waste management technology. This division was taken place so that the explanation regarding their roles and functions could be done without many problems. In addition, the division was also important to help the users to understand the expert system architecture.

a. Priority ranking of technology using AHP

Consultation session using AHP initially started with six phases of pairwise comparison process; [1] criteria against objectives, [2] alternatives against political support, [3] alternatives against technical expertise, [4] alternatives against environmental impacts, [5] alternatives against marketability of products, [6] alternatives against public participation, and further with the process of identifying the benefit priority value. These are the core components of UrusSisa knowledge base. Figure 2 shows the main modules in priority ranking of technology using AHP, which include:

- matrix of comparison module;
- priority analysis module;
- cost analysis module; and
- benefit-cost ratio module.

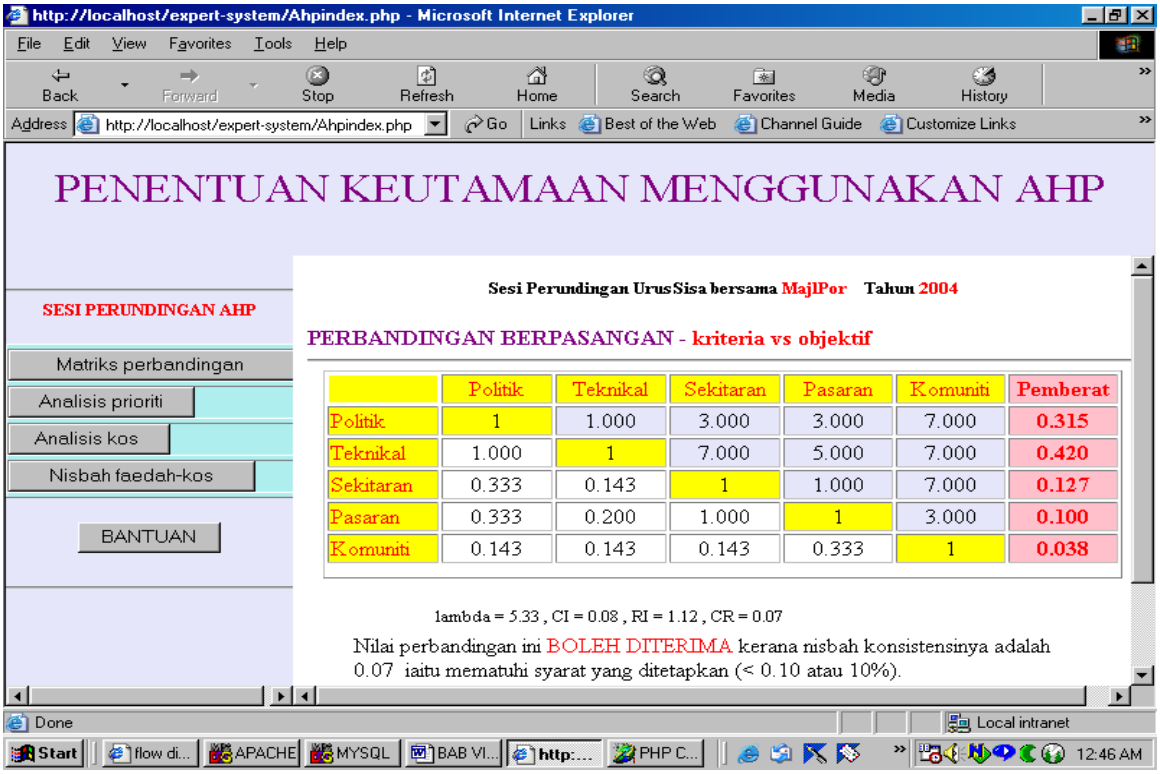


Figure 2 An example window for the priority ranking of the technology

b. Preliminary design of technology

Preliminary design of a solid waste management is the major component of the knowledge base prototype, which includes:

- preliminary design for recycling
- preliminary design for composting
- preliminary design for incineration
- preliminary design for sanitary landfill

From the four components above, each component will have their own individual modules. Basically the modules developed for the preliminary design of recycling are similar to the modules for composting, and incineration. For example, modules for preliminary design of recycling consists of (Fig. 3):

- collection systems
- area design
- storage
- operation and equipment
- material preparation
- processing
- environmental issues
- siting location
- market planning

Production rules was used to represent the knowledge of modules. A production rule resembles a simple sentence. It consists of a condition part, IF, on the left hand side, and an action part (THEN) on the right hand side. If the condition of a rule is satisfied by the working memory, the rule becomes applicable and will be fired by the inference engine. Therefore prototype UrusSisa can act and mimic like human experts in order to give recommendation and suggestion on preliminary design of technology. The following are examples of selecting a suitable recycling collection system using production rules technique:

If ($public == yes)
{echo "frequency of collection recommended is weekly because this will increase the percentage of participation by the community and the rate of recycling. Research done by EPA (1994), shows that the recycling program that capable of achieving high percentage of community participation recycling rate practise a weekly collection frequency during their operations"}
else if ($public == no)
{"frequency of collection recommended is <font color=red> twice weekly < because this will reduce cost for the whole recycling program, instead it will be spent for public education."}
else {echo "No data input. Please re-enter.";}

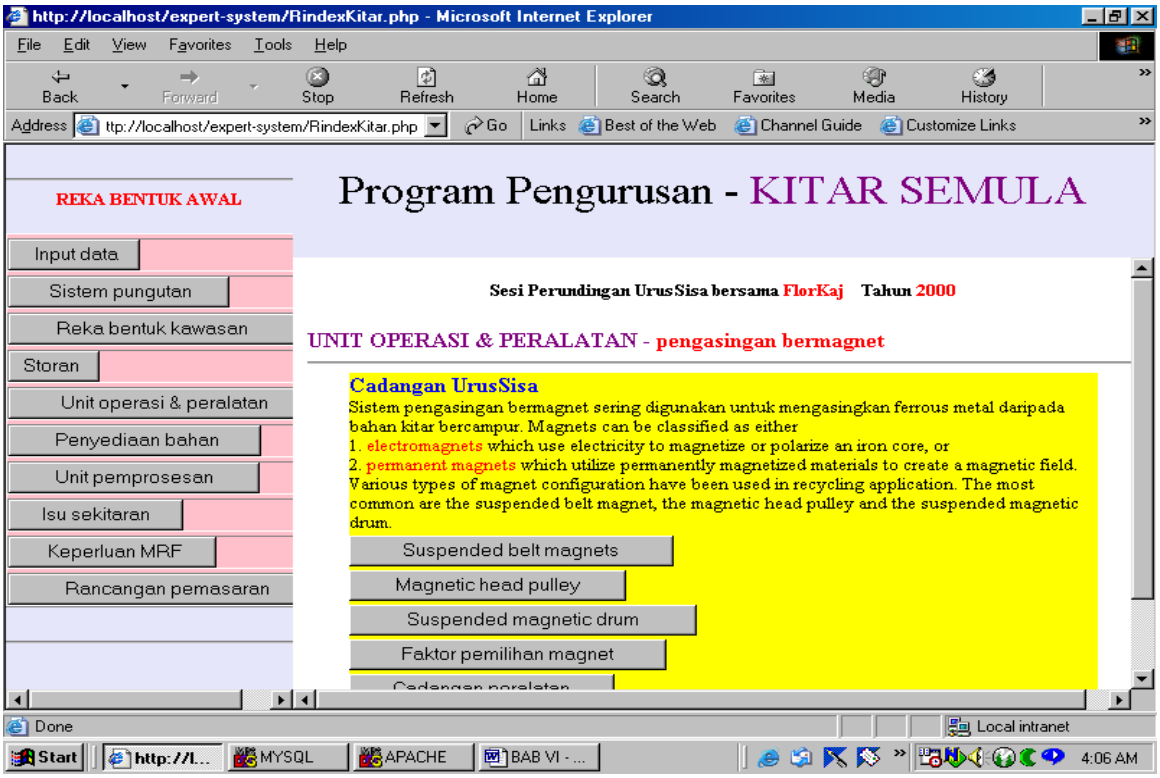


Figure 3 An example window for the preliminary design components of recycling

4. Prototype Verification and Validation Using Case Studies

There is currently no formal approach for assessing prototype performance which is applicable universally. Many prototypes were tested based on case studies, the results of which were analysed internally by the system developers themselves (Berrais 1992). In the case of the UrusSisa, its performance was evaluated internally by the system developer herself and solid waste management experts. One case study was performed; Port Dickson Municipal Council; to evaluate the conceptual design for solid waste management technology. This gave some measure of the accuracy of its knowledge base. Finally, the user-friendliness of the prototype's user interface was evaluated.

4.1 Case study: Port Dickson Municipal Council

Port Dickson Municipal Council – MPPD (formerly known as Port Dickson District Council) is located in Negeri Sembilan. The total area for this municipality is 40 km^2 and serves a population of 106,000. Solid waste generation is mixed at the rate 70 tonnes per day and it was collected by the municipality and contracted company. Solid waste will be disposed at Bukit Palong (64.7 acre), Sua Betong (6 acre) or Pengkalan Kempas (3 acre). However these disposals area is nearly filled and new disposal site must be identified. Implementation of solid waste technology such as recycling, composting and incineration is important to make life span of disposal site is longer.

Expert from MPPD was consulted to get the pairwise comparison value and solid waste input. Analysis AHP shows that the combination of two or three technology such as A4, A7, A6 and A5 have the most benefits, with relative weights of 0.165, 0.159, 0.153 and 0.144, respectively. On the other hand the single technology such as A1, A2 and A3 have much lower values of relative weights in the range of 0.122 – 0.129. It is based on benefit hierarchy which indicates that technical expertise has the highest relative weight of 0.420 among all other criterias considered. It is followed by political support (0.315), environmental impact (0.127), market of end-product (0.100) and community involvement (0.038).

Cost hierarchy shows that combination of recycling and incineration (A7) technology has the most benefits having a relative weight of 0.255. It is followed by A7, A3, A6, A4, A1 and A2; their corresponding relative weights are 0.170, 0.169, 0.150, 0.135, 0.095 and 0.091.

In order to give the complete picture the overall benefit priorities (relative weights) were divided by the cost priorities. An overall normalized benefit-to-cost ratio was obtained for each system. Benefit-tocost ratio is shown that composting (A2) technology have the highest overall benefit-to-cost ratio, with a relative weight value of 0.189. Recycling (A1) technology have the second relative weight of about 0.184. The best system with highest benefit-to-cost ratios are A4, followed by A6, A7, A5 and A3, having relative weights of 0.165, 0.137, 0.126, 0.102 and 0.097.

From AHP analysis, composting is recommended to manage solid waste problem from Port Dickson area. This recommendation is supported by the solid waste composition where 54% of Port Dickson waste is organic material. Beside residential area, tourism activities also contributed to highly composition of organic material. Composting technology can diverse 50% of waste generation rate from disposed to disposal site.

The next consultation session is a preliminary design of composting technology where users need to complete their Input Data first. This component is important to help user design a composting technology. There are 10 modules in this component which includes:

- composting system module;
- site design module;
- operation and quipment module;
- storage module;
- feedstock condition module;
- control parameter modul;
- parameter control module;
- environmental impact module;
- site requirement module; and
- marketing plan module.

5. Conclusion

UrusSisa is a prototype of expert system which can assists the decision maker to establish the most appropriate solid waste technology in an integrated manner. The critical decisions at the planning stage are strived by applying a state-of-the-art Multi Criteria Decision Making (MCDM) technique call the modified Analytical Hierarchy Process (AHP). This ensures that the solid waste management system will take into account the numerous relevant criteria such as political support, technical expertise, environmental impact, end-product market, community involvement, and cost of technology, and their relative importance in an objective manner.

Besides assists in selecting the best technology, UrusSisa also can helps in a preliminary design of the technology. Expertise in the knowledge base was acquired from 22 textual sources, reputed journal publications and solid waste practitioners in Malaysia. The intelligent system was developed using an internet-based platform, hence making it to be very easily accessible to users all over the world. In developing countries where expertise and resources are scarce, this inexpensive system is particularly useful in avoiding ad-hoc or ill-informed decisions which can be unnecessarily costly.

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GIS BASED QUALITY OBSERVATION ANALYSIS AT GEDIZ BASIN IN IZMIR METROPOLITAN MUNICIPALITY BOUNDARY

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İzmir Büyükşehir Belediyesi Sınırlarında Kalan Gediz Havzasında Cbs Tabanlı Kalite Gözlem Analizleri

Gediz River, the length is almost 401 km, is the second biggest river in Anatolia poured out into Aegean Sea. It responds to drinking water necessity of both Gediz Delta and Izmir City. This condition causes over use and consumption of Gediz aquifer. Gediz River collects domestic, industrial and agricultural wastewaters from the places that it passes through and then pours out into Izmir Bay so it causes become polluted of Izmir Bay and damaged of ecosystem. After boundary of Metropolitan Municipality of Izmir has spread out because of new Municipality Regulation no: 5216; much part of Gediz Delta has stayed in boundary of Izmir; so responsibility of municipality in this region has increased. Because of these reasons, the contribution of Gediz River to Izmir Bay's pollution is very much so it can not be denied.

This study tires to look into pollution sources and quality exchange of Gediz River, which remains in boundary of Metropolitan Municipality of Izmir, between the years of 2001 and 2005. At the subbasin, river water samples taken from eight different stations are analyzed and flow measurements are done in river cross section. Achieved data, with spatial and attribute data concerning subbasin are transferred to GIS database. By using GIS technology, with providing visualization of classic database procedures like query and statistical analysis and combination with geographical analysis; the contribution of Gediz River to Izmir Bay's pollution is clearly observed and an effective tool for determination of preventive measures that can be taken is achieved.

Keywords: *River Basin Management, Geographical Information Systems, Pollution Research.*

1. INTRODUCTION

The rapid increase of world population, urbanization, industrialization and unconscious and excess use of agricultural drug and fertilizer in agricultural areas coming with environmental pollution destroy the quality of water resources and the water resources almost turn into the environments wastes are poured in. For this reason, the assurance of drinking and using water we need, its treatment and distribution are very difficult and expensive. As a result, protection, planning and management of water resources become unavoidable.

On the other hand, water resources, especially rivers, are not found in only one administrative border, several managements are interested in them. They are used and polluted by different users. One of the most suitable examples of that is Gediz River Basin. Gediz River arises from Gediz, an administrative district of Kütahya City, and after crossing the provinces of Uşak and Manisa, it pours in Aegean Sea in İzmir City

In this study, its aimed to monitor the exchange of water quality of Gediz River between the years of 2001 and 2005. In accordance with the aim, water samples taken from eight different stations in Gediz River subbasin in 2001 and 2005 have been compared. In the winter month, October of 2001 (Gündoğdu, V., 2003) and November of 2005 values were used. Values of 2005 were achieved by land studies. (IZSU, 2005) In 8 points, pollution monitoring and determination studies were done and these data were evaluated according to Table 1 in Water Pollution Protection Regulation. 7 quality parameters (Chemical oxygen demand, biological oxygen demand, total phosphorus, nitrate nitrogen, aluminum, lead) were considered for comparison. These quality data were transferred to GIS database. Also population and residental area data, sources cause river pollution and geographical features of area were transferred to GIS, too. Consequently; measures that can be taken in this condition have been discovered and the changes of water quality have been indicated more easily.

In the last few years; Geographical Information Systems use as a tool of managing many different types of data that can not be archived by classical archive methods. And also, GIS helps to decide the “suitable decision” on the subject of the events which are relevant to geographical existence. GIS, which have many different application areas, is an effective technological tool of collecting, managing, querying and analyzing data about natural environment and also making suitable decisions about events related to environment. (Yomralıoğlu, T. & Akça, M. 1999)

2. OVERVIEW ABOUT STUDY AREA

Gediz River Basin includes Gediz River, which is the second biggest river in Aegean after Buyuk Menderes River, and its arms. Drainage basin is 17.500 km^2. The stored water quantity is 3.566 hm3. %12,4 of stored water quantity in Turkey is found in Gediz Delta. (Anonim,2001) Gediz River borns from Murat And Saphane mountains and pours out into Izmir Bay between Foca and Camaltı Salinas. Average flow of Gediz River is 60,48 m^3/sec. In addition to high agricultural production potential, rapid increase in industrial development are seen. This causes rapid increase in population of delta.

Gediz Basin encloses the area between Aegean, Susurluk and Kucuk Menderes deltas. It takes place between 38°.04-39°.45' north lattitutes and 26°.42'-29°.45' east longitudes. Project region is Gediz River Basin that stays in the boundary of Izmir Metropolitan Municipality boundary.

Gediz River pours out into İzmir Bay after passing through Maltepe State. Gediz River, collecting domestic, industrial and agricultural wastewaters from the places that it passes through, causes become polluted of Izmir Bay and damaged of ecosystem. Its understood that Gediz River cannot be denied while considering studies done for preventing İzmir Bay's pollution. Because of become polluted of Gediz River rapidly, usage potential of river is decreasing.(NEN, 2001)

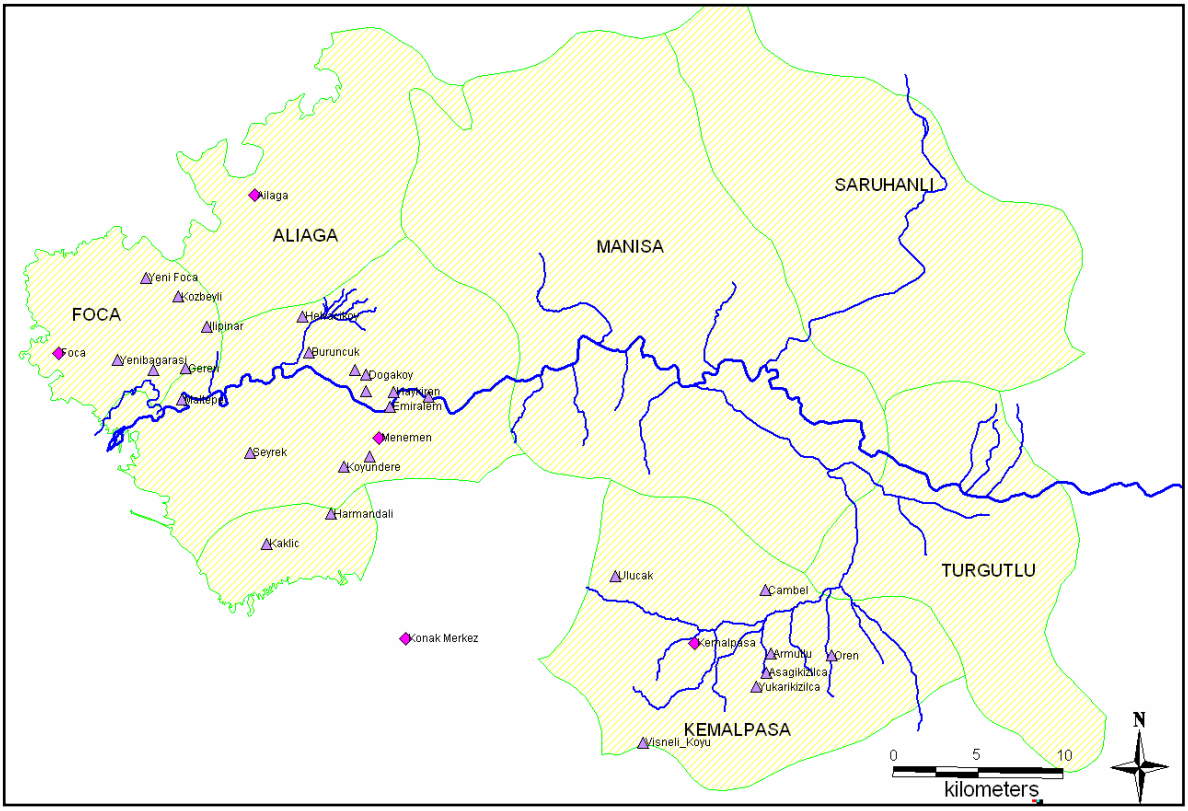


Figure 1: **Project Area**
Şekil 1: ***Proje Alanı***

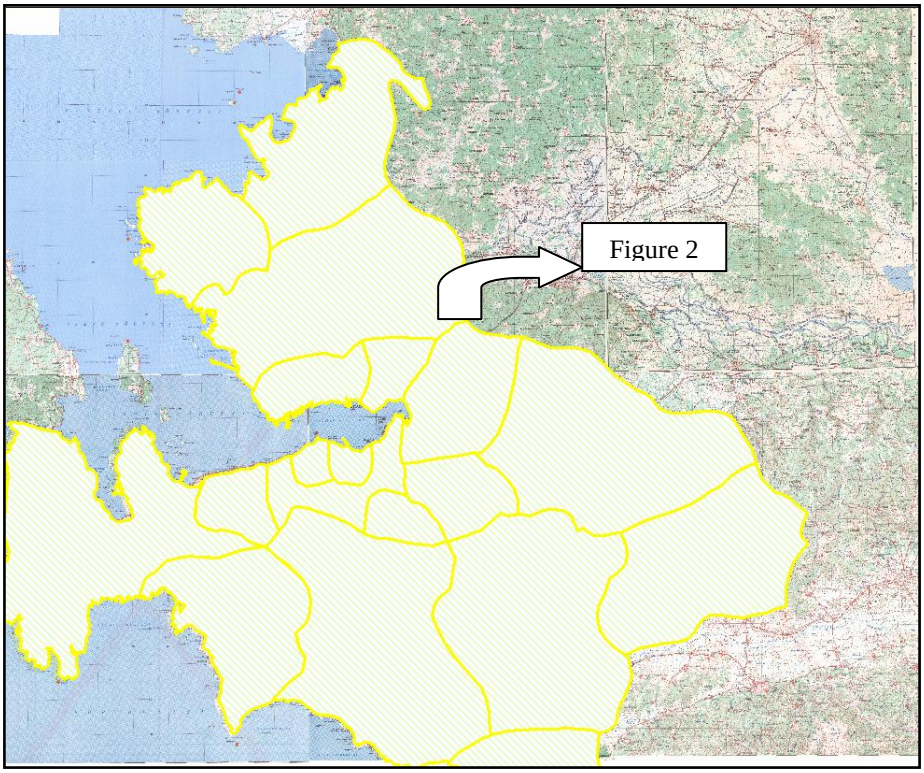


Figure 2: **2-D Wiev of the Study Area**
Şekil 2: ***Çalışmanın Alanının 2 Boyutlu Görünümü***

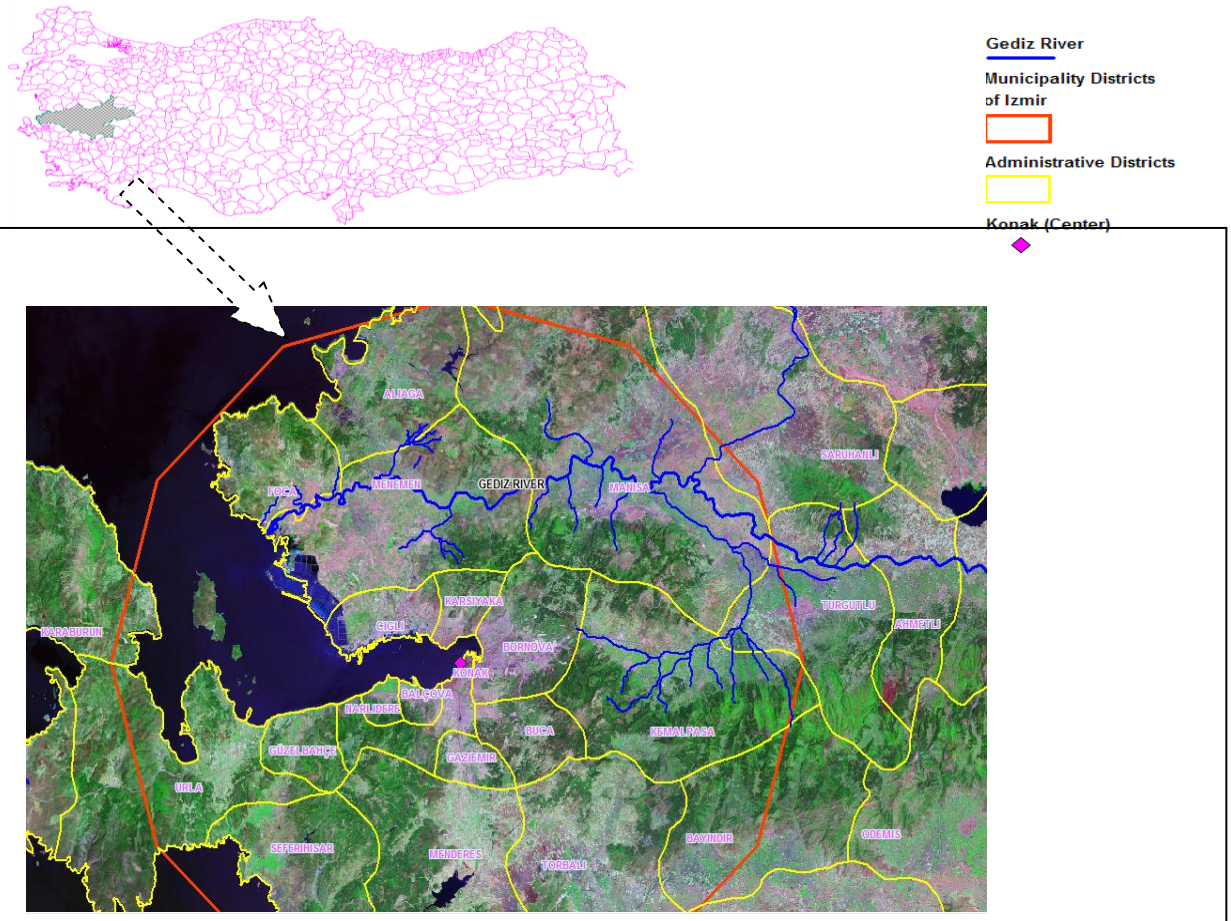
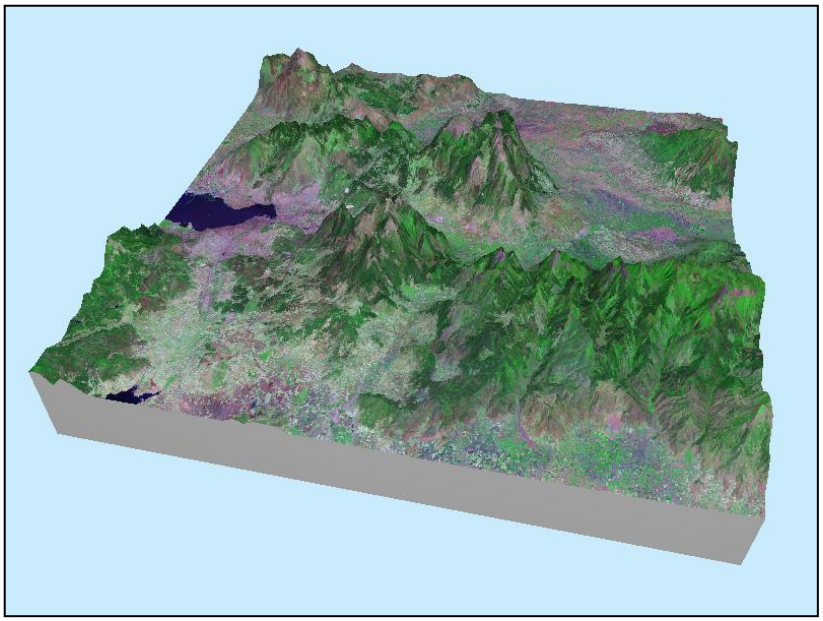


Figure 3: **The Location of the Study Area**
Şekil 3: ***Çalışma Alanının Lokasyonu***

Figure 4: **3-D Wiew of Study Area**
Şekil 4: ***Çalışma Alanının 3 Boyutlu Görünümü***



3. METHODS AND ANALYSIS

In Gediz subbasin at the date of 10/2005 and 11/2006, water samples were collected form quality stations up to sample taking techniques and were analyzed. All analysis were carried out according to Table 1 in Water Pollution Protection Regulation.(Anonim, 2004) All achieved data was inserted into a GIS (MapInfo 7.5 program was used). Different prediction maps were produced by using thematic map attribute of MapInfo program for each of the different parameters including BOD, COD, nitrate nitrogen, total phosphorus, aluminum, lead and total chrome. Studies were done in Windows XP operating system.

QUALITY STATIONS	**COORDINATE (m)**
Station I: NİF II Bridge	X: 0545.286 Y: 4.255.502
Station II: Askılı Bridge (NİF)	X: 0553.640 Y: 4.262.102
Station III: DSİ TEFER Station (NİF + IRLAMAZ)	X: 0549.964 Y: 4.270.184
Station IV: Irlamaz River (IRLAMAZ)	X: 0553.136 Y: 4.269.896
Station V: EIE Station	X: 0538.347 Y: 4.277.013
Station VI: TEFER Station	X: 0528.850 Y: 4.281.374
Station VI: Emiralem Regulator	X: 0515.172 Y: 4.275.585
Station VII: Maltepe Bridge	X: 0492.600 Y: 4.274.100

Remote sensing image was used to extract geological features. The composite satellite image was a LANDSAT image produced in 2000 with 28.5 meter resolution. Toposheets of 1:100000 scale at 50 meter contour interval were used to generate altimetry information. Geo-referenced satellite images and topographic maps were used as the base map for the study. Information about facilities polluting Gediz River and population data according to the general population census in 1997 and 2000 of study area were transferred to GIS, too.

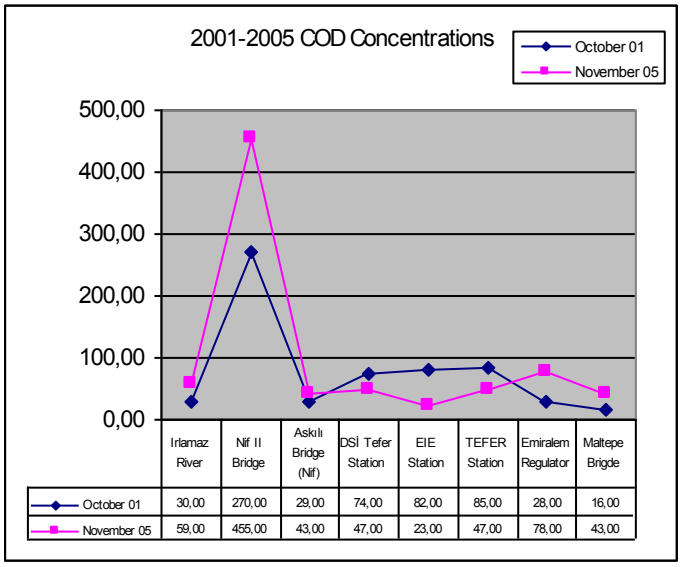
Table 1: **Layers in the Project, Metadata of the Layers and Their Types**
Tablo 1: *Projedeki Katmanlar ve Veri Tipleri*

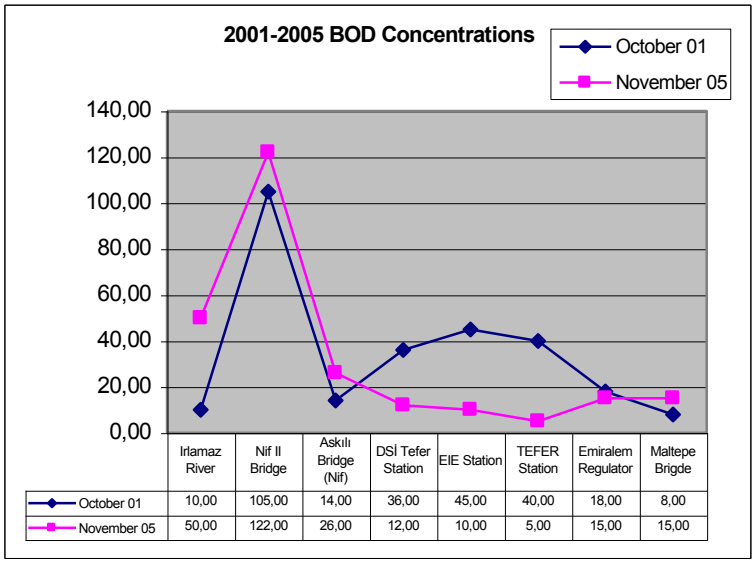
LAYERS	SPECIAL FEATURE CLASSES	DATABASE	
Equal Level Curves	**Line**	• **Curve_ID**	• **Small Integer**
Stream beds, Gediz River and channels	**Line**	• **ID** • **Name** • **Length_km** • **Flow**	• **Small Integer** • **Character(15)** • **Decimal(7,2)** • **Decimal(7,2)**
Main and secondary roads	**Line**	• **Road_ID** • **Road_Name**	• **Integer** • **Character(35)**
Facilities in Kemalpaşa and Menemen	**Point**	• **ID** • **Name** • **Place** • **X_and_Y _Coordinate** • **Activity** • **Domestic Wastewater_Use_ Amount** • **Discharge place** • **Used_Fresh _Water** • **Wastewater Flow** • **Treatment Plant** • **TSS,BOD,COD quantity**	• **Small Integer** • **Character** • **Character** • **Float** • **Character** • **Float** • **Character** • **Float** • **Float** • **Character** • **Float**
Sampling Stations	**Point**	• **Point_ID** • **Point_Name** • **Sample_Amount** • **X_Coordinate** • **Y_Coordinate**	• **Small Integer** • **Character(20)** • **Character(10)** • **Decimal(10,2)** • **Decimal(10,2)**
Administrative districts and settlements	**Point**	• **ID** • **Name** • **Depend_Upon_District** • **Population_1997** • **Population_2000**	• **Small Integer** • **Character(25)** • **Character(12)** • **Integer** • **Integer**

4. RESULTS AND DISCUSSIONS

In figure 5, the concentrations of measured parameters are shown for October 2001 and November 2005. In figure 7, concentration increase values between October 2001 and November 2005 of all parameters are shown. Value changes at all stations for all parameters can be seen very clearly in figure 7. Open colors mean change is in positive direction and darker colors mean change is in negative direction in 2001 to 2005.

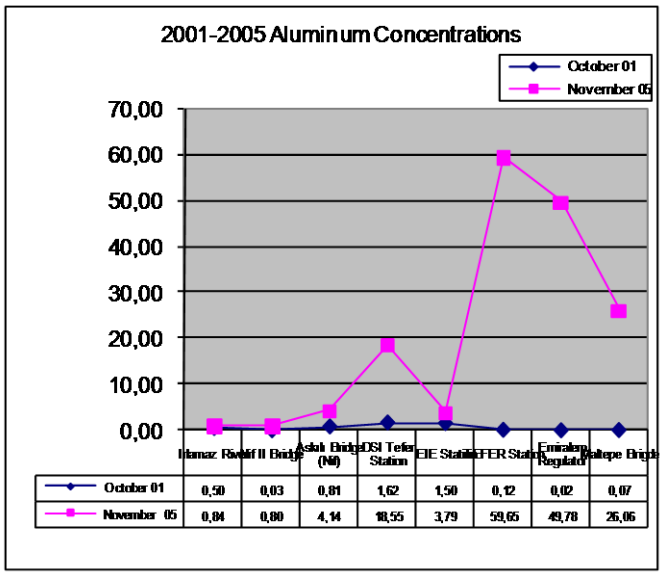
Parameters 2001-2005 **(1)**



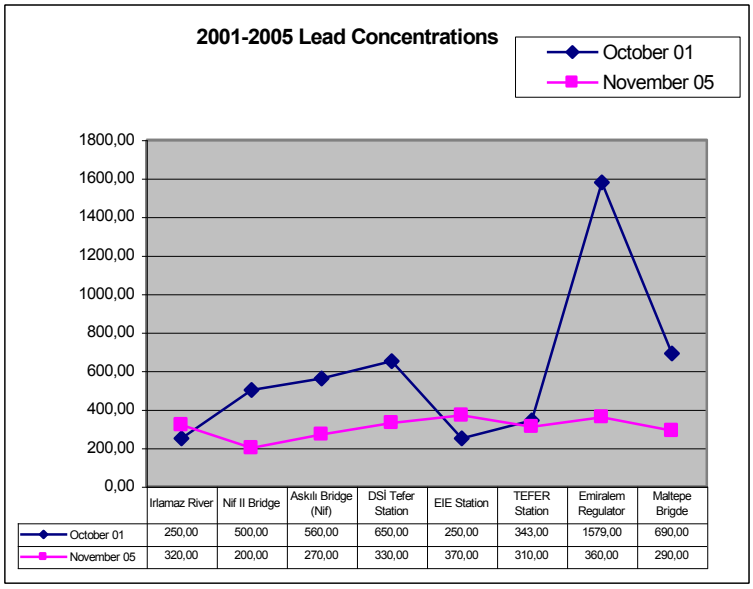


COD	1st Class	2nd Class	3rd Class	4th Class
Value	25	50	70	>70

BOD	1st Class	2nd Class	3rd Class	4th Class
Value	4	8	20	>20

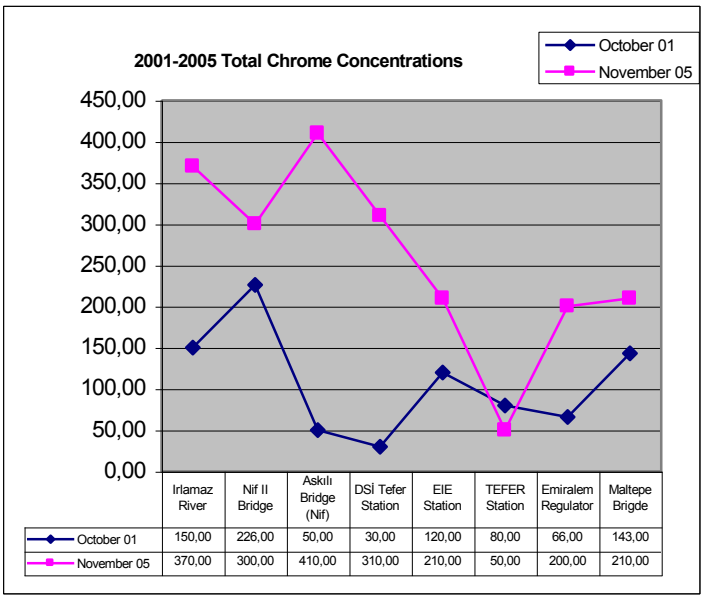


Aluminum	1st Class	2nd Class	3rd Class	4th Class
Value	0,3	0,3	1	>1

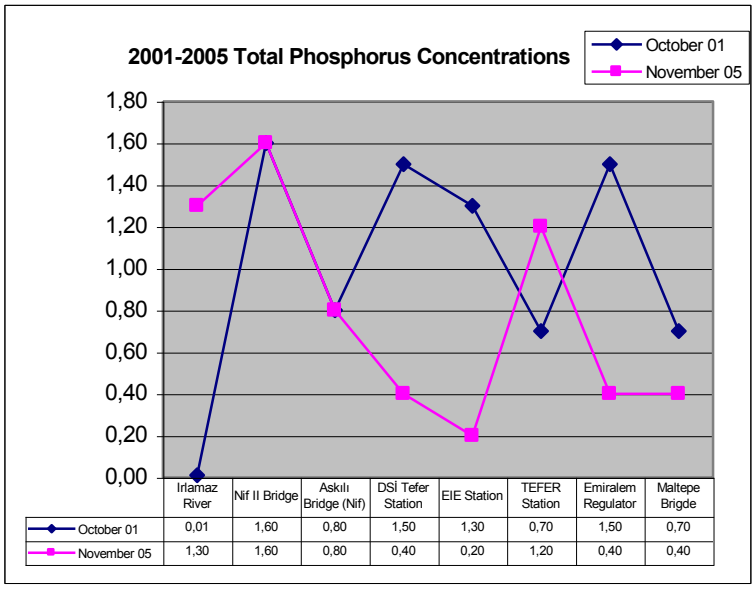


Lead	1st Class	2nd Class	3rd Class	4th Class
Value	10	20	50	>50

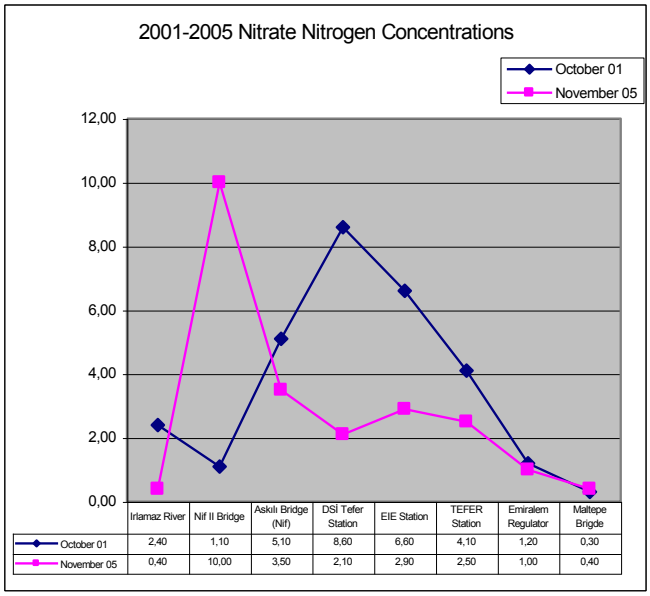
Parameters 2001-2005 **(2)**



Chrome	1st Class	2nd Class	3rd Class	4th Class
Value	20	50	200	>200



Phosphorus	1st Class	2nd Class	3rd Class	4th Class
Value	0,02	0,16	0,65	>0,65



Nitrate	1st Class	2nd Class	3rd Class	4th Class
Value	5	10	20	>20

Figure 5: **Concentrations of Parameters**
*Şekil 5: **Parametrelerin Konsantrasyonları***

The real source causes industrial pollution in Gediz River is industries discharge their wastewaters to the river. These facilities are found at Kemalpasa and neighborhood of it generally. In figure 5 , BOD and COD charges are shown. As it's understood form figures, maximum charges cause from paper, food, beverage, leather, mine and ceramic industries. And also because of the low flow of river in this region, highest values were seen for all parameters.

Aluminum: In the year of 2001, river water generally continued between 3rd and 4th class water quality and in 2005, aluminum values could not provide even 4th class water quality. It's seen that agricultural medicines, fertilizers and metal industry compose pollution. High aluminum concentrations verify industrial pollution.

Lead: In 2001, lead parameter could not provide even 4th class water quality values. In 2005, river water continued in the same quality. It's determined that agricultural medicines and also metal, pipe, accumulator and mine sectors compose pollution.

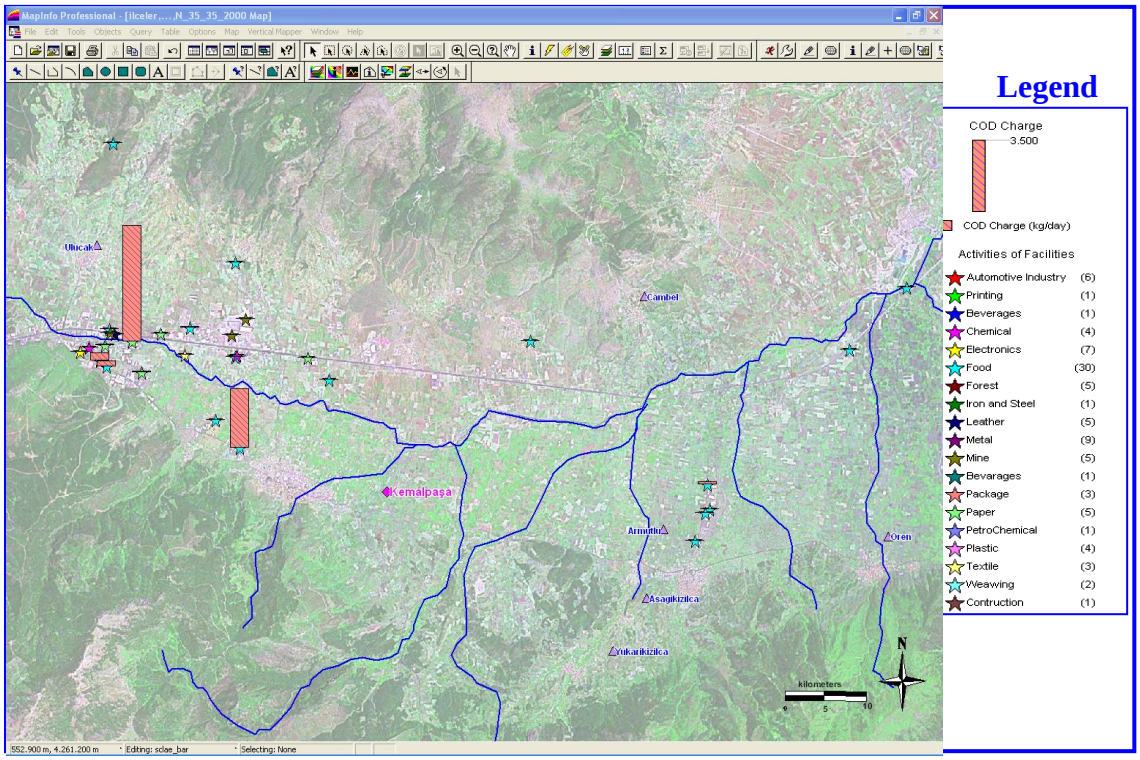
Total Chrome: In 2001, the worst value determined at Nif-II Bridge and water quality was under 4th class. In 2005, water quality was determined 1st class at TEFER Station, but at other stations could not provide even 4th class water quality values. It's seen that an improvement could not be seen between these years. Total chorome pollution causes from metal and textile sectors.

Total Phosphorus: In 2001, at Irlamaz River station 1st class water quality provided but at other stations river water could not provide even 4th class water quality values. In 2005, water quality could not leap over 3rd class water quality but it was determined that there was a bit improvement compared to 2001. Total phosphorus pollution causes from agricultural activities.

COD: In 2001 in the COD parameter, only Maltepe Bridge station provided 1st class values. The best water quality was between 3rd and 4th classes in 2001. In 2005, it was seen that water quality could not leap over 3rd class and the highest level was at Nif-II Bridge. COD pollution causes from dairy product processing industries and olive-oil industries.

BOD: In both two periods, water sample results were between 3rd and 4th classes. Like COD parameter, the highest level was determined at Nif-II Bridge for BOD, too. Pollution is emanated form domestic wastewaters and high industrial pollution.

Nitrate Nitrogen: In 2001, at all stations except DSI TEFER and EIE stations, water quality proceeded 2nd class. In 2005, highest level was seen at Nif-II Bridge, at other stations water quality was determined 1st water quality. It's determined that agricultural studies compose pollution



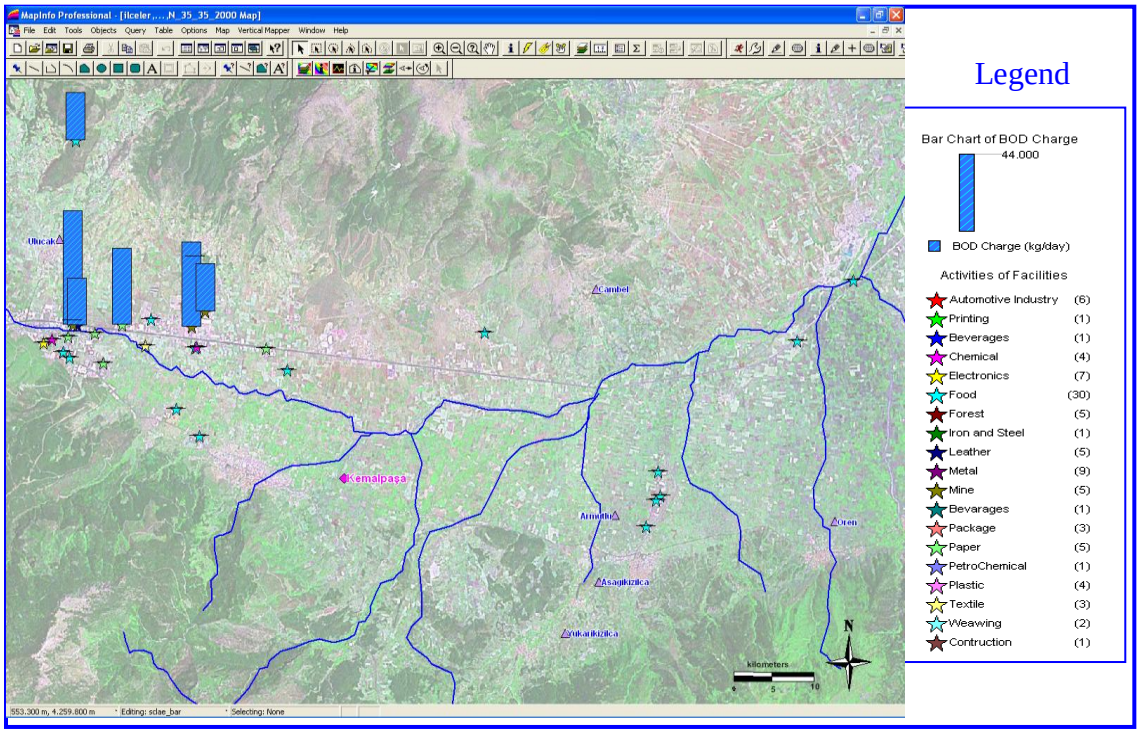
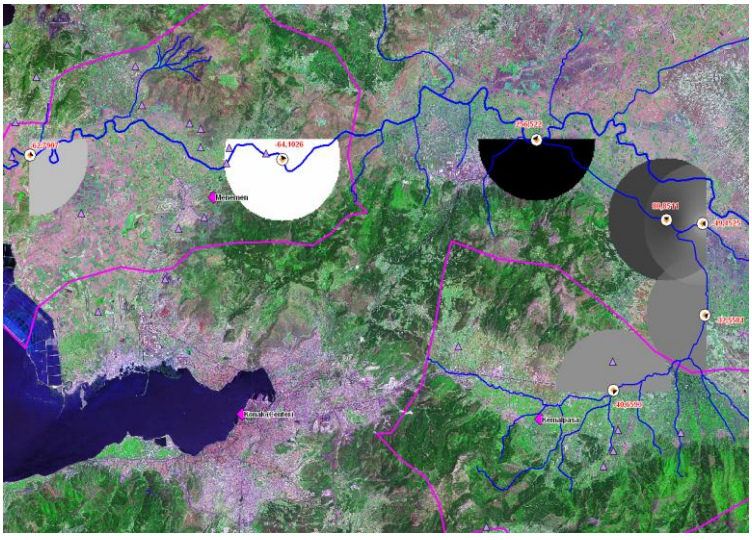
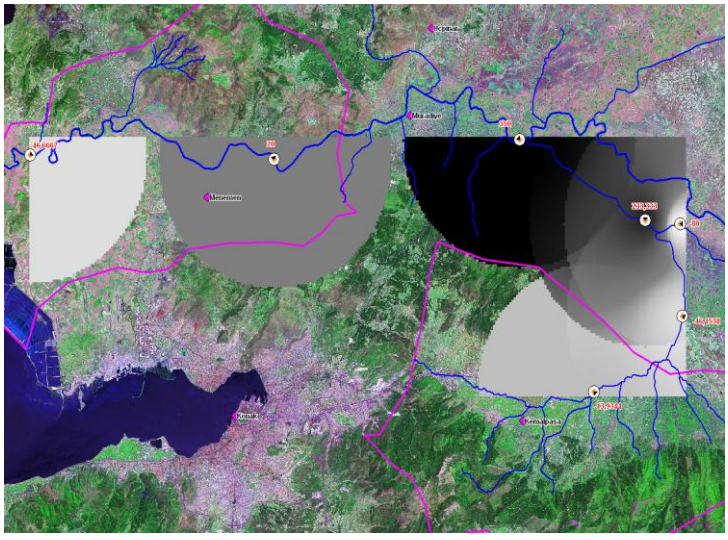


Figure 6: BOD and COD Charges of Industrial Facilities
Şekil 6: *Endüstriyel Tesislerin BOI ve KOI Yükleri*

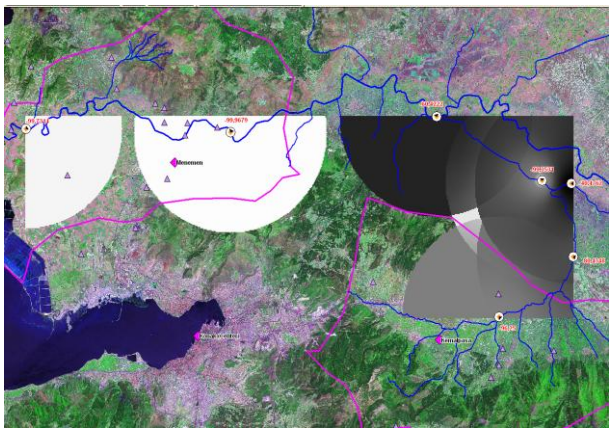
Variation of the parameter values between the years of 2001-2005 (1)



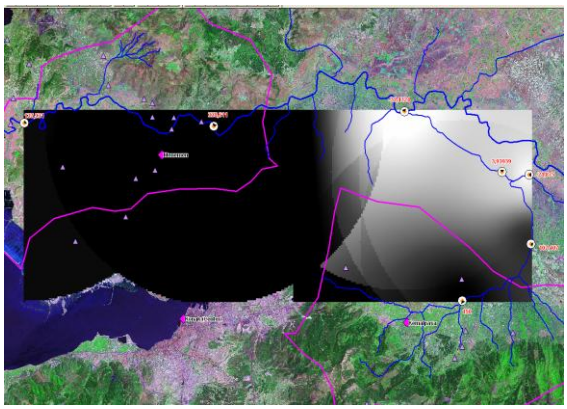
COD change (mg/lt)



BOD change (mg/lt)

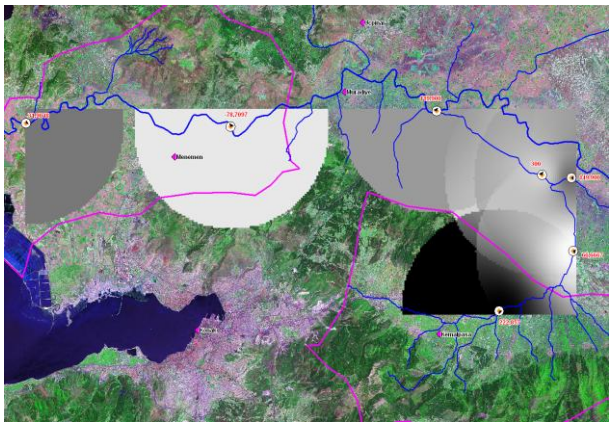


Aluminum change (mg/lt)

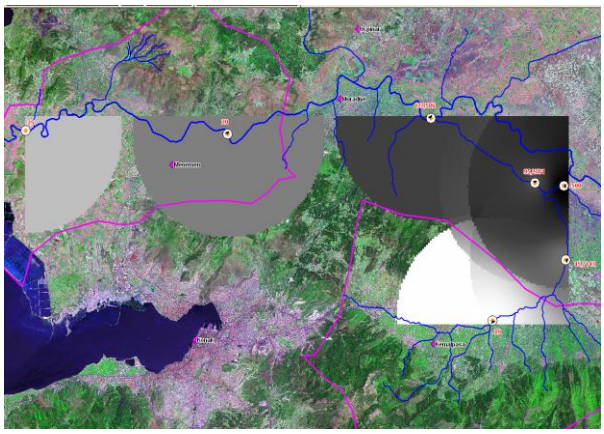


Lead change (mg/lt)

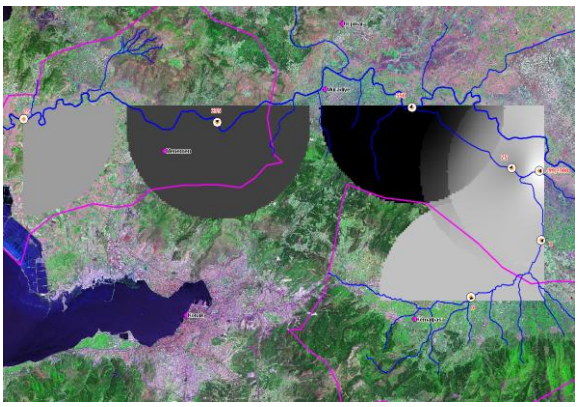
Variation of the parameter values between the years of 2001-2005 (2)



Total Chrome Change (mg/lt)



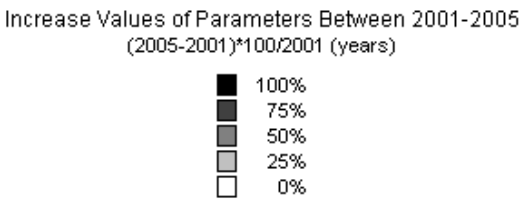
Nitrate Nitrogen Change (mg/lt)



Total Phosphorus Change (mg/lt)

Figure 7: Concentration Increase Values of the

Şekil 7: *Parametrelerin Konsantrasyon Artış*



5. CONCLUSIONS

In the near future, more comprehensive area information is needed for environmental analysis. To have carefully considered information about environmental and to give more suitable decisions for preventing pollution, we need to know all characteristics of environment under consideration. In this respect, collection, storage and query of environmental data in the digital surround must be done before all else to provide possibility for attribute analysis. In the meaning of this; GIS seems to be the most effective technological tool that is used. Land models formed in computer environment, especially with existing location information propped up by satellite images, they submit many-sided dynamic interrogate environment to users. In Gediz River Basin, environmental pollution appears importance. If we look at the results of study, it can be seen that water quality is very bed and is decreasing in past years terms for all parameters.

Determined pollution in Gediz Basin sources from;

- Domestic wastewaters, that sourced from settlement places, discharged to Gediz River by not purified in wastewater treatment plants,
- Agricultural medicines used unconsciously,
- Industrial wastewaters, that sourced from industrial facilities, discharged to Gediz River by not purified in wastewater treatment plants.

As a result; it is determined that the inorganic pollution is too much where the pollution begins from industrial regions, agricultural medicines and fertilizers redouble pollution and small industrial estates and domestic wastewaters are very important factors of pollution. As a solution; wastewater treatment plants that collect domestic wastewaters can be done for settlement places, industrial facilities can be collected in the same places and a common wastewater treatment plant for industrial regions can be done. The recognition of the problems is just one step. It is hoped that the public will become more aware of its environmental problems and the opportunities open to reclaim Gediz River as a recreational and urban wildlife resource and urge governmental officials to direct significant funds to make Gediz River as a success story not a tragedy.

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Near East University, Nicosia-Northern Cyprus

REHABILITATION OF ASBESTOS MINING WASTE: A REHABILITATION PRIORITISATION INDEX (RPI) FOR SOUTH AFRICA

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The much publicised problem with major asbestos pollution and related health issues in South Africa, has called for action to be taken in order to negate the situation. The aim of this project was to establish a prioritisation index that would provide a scientifically based sequence in which asbestos mines pollution in Southern Africa ought to be rehabilitated. It was reasoned that a computerised database capable of calculating such a Rehabilitation Prioritisation Index (RPI) would be a fruitful departure from the subjective selection prone to human bias used previously. The database was developed in Microsoft Access and both quantitative and qualitative data were used for the calculation of the RPI-value. The logical database structure consists of a number of mines, each consisting of a number of dumps, for which a number of samples have been analysed to determine asbestos fibre contents. It should be realised that in order for this system to be accurate as well as relevant, the data in the database should be revalidated and updated on a regular basis.

INTRODUCTION

Asbestos occurs naturally in almost 60-70% of the earth's crust and is found in two varieties: serpentine asbestos and amphibole asbestos. The most common asbestos types are chrysotile (white asbestos), which is a fibrous serpentine asbestos; and amosite (brown asbestos) and crocidolite (blue asbestos), which are amphiboles. Other forms of amphibole asbestos include actinolite, anthophyllite and tremolite (#1).

Asbestos has a number of applications in construction and manufacturing processes due to several industrially desirable characteristics, including: high tensile strength, fire and heat resistance, durability and versatility (#2). However, due to the harmful health effects of asbestos dust mining (#3, #4), the use of asbestos materials in developed nations has been decreasing. During the 20th century, evidence began suggesting that asbestos fibres could lead to serious health disorders, such as asbestosis, lung cancer and mesthelioma. Subsequently, asbestos became the focus of extensive scientific and medical research. Research indicated that all asbestos fibres are not alike and that fibre length and type, dose and exposure play a significant role in the health risk associated with occupational and environmental exposure to asbestos fibres (#2, #5). Scientific consensus exists on the fact that fibres in the amphibole group are more harmful (100 to 500 times) to health than chrysotile, particularly for mesthelioma (#6).

Asbestos mining waste poses a significant health risk to those living in surrounding areas and has received much attention in recent years (#2). Despite the fact that all South Africa's asbestos mines and mills are now effectively closed, this industry has left a legacy of pollution that continues to poison former mining areas as well as surrounding areas, including school yards, roads, gardens and homes of residents (#7). The much publicised problem with major asbestos pollution and related health issues in South Africa, has called for action to be taken in order to negate this situation. The development of a prioritisation index for the rehabilitation of South Africa's asbestos mining waste sites is a step in that direction.

SYNTHETIC METHODOLOGY AND DATA

Synopsis

The database was developed in Microsoft Access and both qualitative and quantitative data were considered for calculation of the RPI-value. The logical database structure consists of a number of mines (in the respective provinces), each consisting of a number of dumps, for which a number of samples have been analysed to determine asbestos fibre contents. The database structure is outlined by the diagram in Figure 1.

Enumeration of asbestos risk parameters

In order to collect all relevant information pertaining to a specific mine pollution source technical personnel conducted site visits during which both qualitative data and samples for quantitative analysis were gathered. Qualitative data included variables such as demographic, geographic, safety and esthetical considerations that were very difficult to quantify exactly and will always be subjective depending on the experience of the individual that collected the information. A set of definitions describing what was meant by each qualitative data parameter, how this information was obtained and validated, as well as the conversion factors used to incorporate these values into the database was established and are available for use with the database. A summary of these definitions is provided in Table 1. During each site visit a ten kilogram sample was collected from every potential mine pollution source and quantitatively analysed in the mini-asbestos processing plant, in order to determine the total percentage free asbestos fibre contained within the sample. The percentage short fibres within the extracted free asbestos fibre were determined by means of a Canadian shake box.

Table 1 contains the definitions of parameters used and assumptions made during the calculation of the RPI value. In addition to the parameters indicated in the table the following were also considered:

Safety: This information focused on the presence and number of dangerous highwalls and/or adits which could serve as a potential source of danger to both humans and animals. The exact numbers of highwalls and/or adits were noted and normalised for incorporation in the calculation of the RPI value.

Aesthetics: This information focused on whether past mining activities and indications thereof represent a negative esthetical impact on the natural environment.

Calculation of the RPI-value

Calculation of the RPI-value entailed using a formula in which both the quantitative and qualitative data were taken into consideration, but not in a simple additive manner. For example, because of the non-subjectivity and direct relevance to human health the fibre hazard was considered to contribute fifty percent to the calculated RPI.

Three important factors composed the fibre hazard; (i) the total percentage free fibre as determined by the mini-processing plant, (ii) the estimated scale of the exposed surface area of the mine pollution source, and (iii) the percentage short fibre present in the total free fibre content. When the total percentage free fibre in a sample was equal to or exceeded 1.8 % it could potentially contribute from 8 – 40 % to the RPI-value depending on the relative estimated exposed surface area of the pollution source. This fractional contribution was determined by the relative size of the exposed surface area that could vary between one and five, divided by five and multiplied by forty. In relative terms the largest potential mine pollution source in the database was considered to be a five in size, being the Msauli complex, whilst a potential pollution source the size of Zukudu was considered to be a one in size. The percentage short fibre present in the total free fibre content contributed the remainder, up to a maximum of 10 %, to the potential 50 %. Of the qualitative data parameters; the potential for air pollution (composed of six variables), the potential for erosion and other general pollution (composed of nine variables), safety and aesthetics could potentially contribute 25%, 19.5%, 5% and 0.5% respectively to the calculated RPI-value. Actual and normalised values, their units and ascribed weights used during the calculation of the RPI-value are indicated in Table 2.

CLASSIFICATION METHOD AND RESULTS

Two mine localities previously identified as high risk localities were selected as case studies to illustrate the calculation of the RPI-value (Table 3). The Whitebank mine is an amphibole asbestos mine, while the Senekal mine is a chrysotile asbestos mine. The calculated RPI-value for both these mines indicated a high priority for rehabilitation.

DISCUSSION

The development of the asbestos rehabilitation prioritisation index means that for the first time there is a scientifically-based method to determine the need for rehabilitation of asbestos pollution by quantifying the risk associated with a specific pollution site. It is important to realise that the success of rehabilitation necessarily depends on the sustainability of the rehabilitative measures applied. This is also applicable to the RPI and explains the importance of frequently revising the information used in the database in order to ensure relevant and accurate risk assessments.

The database contains information for 113 mines and 144 mine dumps, located in four provinces (Gauteng, Mpumalanga, Northern Cape and Northern Province). Each mine was assessed according to a number of defined parameters and weighted factors as indicated in Table 1 and Table 2. The cost of rehabilitation for each mine, as well as the total cost for rehabilitation of all mines located in a specific province can also be determined from the database.

Figure 1. A diagrammatical representation of the Rehabilitation Prioritisation Index (RPI) database structure.

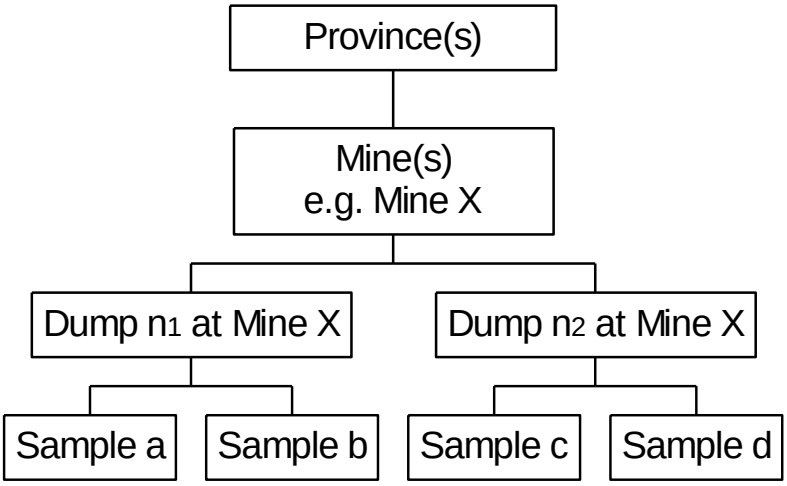

Table 1. Parameters of assumptions used during the calculation of the Rehabilitation Prioritisation Index (RPI) value.

Fibre hazard	*Potential for air pollution*	*Erosion potential and general pollution*
Total percentage free fibre – a value higher than 1.8% indicates a need for rehabilitation.	Distance of nearest settlement from pollution source – this value serves to indicate the potential for fibre release that can be caused by normal daily activities.	Annual rainfall.
A sample – typically weighs 10kg and collected on the top or bottom 50% of any dump but could also have been collected where secondary asbestos pollution occurred.	Number of inhabitants occupying the settlement adjacent to the pollution source.	Located in waterway - only a yes or no answer.
The processing plant – constitutes a miniaturised replica of a commercial asbestos processing plant that operates on a closed circuit basis.	Wind direction relative to inhabitants – only used in the calculation of the RPI-value when the dominant wind direction fell within 270^{o} of the direction relative to where the inhabitants live.	Number of inhabitants in nearest settlement in direction of waterway.

Table 1. Cont.

Percentage short fibre – characterises that fraction of the total percentage free fibre that is short enough to pass through a –30 mesh sieve.	Dominant wind speed – calculated irrespective of whether the dominant wind direction was found to occur in summer or winter.	Distance of nearest settlement in direction of waterway.
	Distance of inhabitants in the dominant wind direction.	Three types of erosion – evident on areas where sampling occurred, including: • ripple erosion • gully erosion • slide erosion
	Number of inhabitants in the dominant wind direction.	Type of drainage system – using the following definitions as guidelines†: • perennial river • ephemeral river • wetland • flood plain
		Terrain type – using the following definitions as guidelines‡: • Flood plain • Steep slope (>18°) • Mild slope (<18°) • Plato

† Provision where none of the definitions was applicable to a specific site was also made. This data was verified by comparison with 1:50 000 maps of the respective areas.
‡Where none of the above is applicable, a value indicating no influence ('no data') can be used.

Table 2. Actual and normalised values, their units and ascribed weights used during the calculation of the Rehabilitation Prioritization Index (RPI) value:

DESCRIPTION OF FACTOR	*UNITS*	*ACTUAL AND NORMALISED VALUES*	*WEIGHT*
FIBRE HAZARD:			
Total percentage free fibre	%	If < 1.8 then weight = 0; If >= 1.8 then weight = Scale/5*40	0.0 – 0.4
Short fibre as a percentage of free fibre	%	Short fibre	0.01
POTENTIAL AIR POLLUTION:			
Distance of nearest settlement from pollution source	M	0 - 499 - 100 500 - 999 - 90 1000 - 1999 - 70 2000 - 2999 - 50 3000 - 3999 - 35 4000 - 4999 - 20 5000 - 30000 - 5 30001 - 900000 - 0	0.04
Number of inhabitants	Number	50 - 0000 - 100 40 - 49 - 80 30 - 39 - 65 20 - 29 - 50 10 - 19 - 35 1 - 9 - 20 0 - 0 - 0	0.03
Wind direction relative to inhabitants	Number	100% in direction of inhabit 100 75% in direction of inhabit 75 50% in direction of inhabit 50 25% in direction of inhabit 25 0% in direction of inhabit 0	0.05

Table 2. Cont.

Winter/summer most dominant wind speed	Km/h	30 - 50000 - 100 20 - 29 - 50 10 - 19 - 25 4 - 9 - 15 0 - 3 - 0	0.06
Distance of inhabitants (Winter/summer most dominant wind direction)	Km	0 - 99 - 100 100 - 199 - 90 200 - 299 - 80 300 - 399 - 70 400 - 499 - 60 500 - 999 - 50 1000 - 2999 - 40 3000 - 4999 - 35 5000 - 9999 - 30 10000 - 24999 - 25 25000 - 49999 - 10 50000 - 500000 - 0	0.02
Number of inhabitants (winter/summer most dominant wind direction)	Number	50 - 100000 - 100 40 - 49 - 80 30 - 39 - 65 20 - 29 - 50 10 - 19 - 35 1 - 9 - 20 0 - 0 - 0	0.05
Annual rainfall	Mm pa	900 - 9999 - 100 700 - 899 - 90 500 - 699 - 75 300 - 499 - 50 200 - 99 - 25 1 - 199 - 10 0 - 0 - 0	0.03
Located in waterway	Yes/no	Yes 100 No 0	0.035
Number of inhabitants in nearest settlement in direction of waterway	Number	50 - 30000 - 100 40 - 49 - 80 30 - 39 - 65 20 - 29 - 50 10 - 19 - 35 1 - 9 - 20 0 - 0 - 0	0.025

Table 2. Cont.

Distance of nearest settlement in direction of waterway	M	0 - 499 - 100 500 - 999 - 90 1000 - 1999 - 80 2000 - 2999 - 50 3000 - 4999 - 20 5000 - 9999 - 10 10000 - 99999 - 5 100000 - 9999999 - 0	0.02
Erosion – ripple	Yes/no Number	100 - 30000 - 100 50 - 99 - 90 30 - 49 - 50 10 - 29 - 30 1 - 9 - 10 0 - 0 - 0	0.01
Erosion – gully	Yes/no Number	10 - 1000 - 100 6 - 9 - 90 3 - 5 - 75 2 - 2 - 50 1 - 1 - 25 0 - 0 - 0	0.03
Erosion – slip	Yes/no	4 - 30000 - 100 3 - 3 - 75 2 - 2 - 50 1 - 1 - 25	0.03
Type of drainage system	Number	Perennial river - 100 Perennial small river - 95 Ephemeral river - 80 Perennial tributary/rivulette - 60 Ephemeral tributary/rivulette - 50 Ephemeral stream - 40 Flood plain - 30 Wetland - 15 Hollow - 10 None - 0	0.005
Terrain type	Description	Flood plain - 100 Slope>18(Steep) - 75 Slope <18 - 25 Plato - 10 No data - 0	0.01
SAFETY:		10 - 30000- 100 5 - 9 - 75 2 - 4 - 50 1 - 1 - 25 0 - 0 - 0	0.05
AESTHETICS:		Yes 100 No 0	0.005

Table 3: Case studies of two high risk mines, illustrating the calculation of the RPI-value. Normalised values are indicated in brackets.

Description of factor	*Whitebank*	*Senekal*
RPI	69.33	71.33
Fibre Hazard		
Total % free fibre	8.46	2.17
Short fibre as % of free fibre	86.93	96.33
Potential air pollution		
Distance of nearest settlement from pollution source (m)	500 (90)	10 (100)
Number of inhabitants	60 (100)	100 (100)
Wind direction relative to inhabitants	100 % in direction of inhabitants (100)	100 % in direction of inhabitants (100)
Winter/summer most dominant wind speed (km/h)	3.77 (15)	0 (0)
Distance of inhabitants (Winter/summer most dominant wind direction)	500 (50)	10 (100)
Number of inhabitants (Winter/summer most dominant wind direction)	60 (100)	100 (100)
Potential erosion and general pollution		
Annual rainfall (mm)	410 (50)	700 (90)
Located in waterway	Yes (100)	Yes (100)
Number of inhabitants in nearest settlement in direction of waterway	30 (65)	200 (100)
Distance of nearest settlement in direction of waterway	5000 (10)	100 (100)
Erosion – ripple	Yes, 20 (30)	Yes, 20 (30)
Erosion – gully	Yes, 6 (90)	Yes, 10 (100)
Erosion – slip	No (0)	No (0)
Type of drainage system	Ephemeral stream (40)	Ephemeral stream (40)
Terrain type	Slope > 18 (75)	Slope < 18 (25)
SAFETY	None, no highwalls (0)	Yes, 5 highwalls (100)
AESTHETICS	Yes (100)	Yes (100)

Though the establishment of this RPI is a fruitful departure from current, more subjective methods, it is dependant on the quality of the data in the database. In this regard we would like to point out some areas of concern in the current data basis. The areas of concern pertain mainly to the qualitative data. For example, obtaining the correct rainfall figures and wind direction/speed relevant to a specific mine pollution source is not as simple as it might seem, as those first- and second order weather stations that gathered the relevant information was sometimes situated kilometres away from the specific mine pollution source in question and assumptions had to be made as described in the definitions. The qualitative data used for calculation of the RPI, included variables such as demographic, geographic, safety and esthetical considerations that were very difficult to quantify exactly and will always be subjective depending on the experience of the individual that collected the information. Furthermore, it should be realised that some of the qualitative data collected, for example the number of inhabitants in the prevailing wind direction, are not static and will likely change with time necessitating a constant updating of the data.

CONCLUDING REMARKS

The use of the Asbestos Rehabilitation Prioritisation Index has been implemented by the South African Department of Minerals and Energy as part of the governments' integrated and co-operative approach towards the rehabilitation of the asbestos legacies of the past. In accordance with this index, 145 derelict and ownerless asbestos mines/dumps have been identified, of which only 84 still need to be rehabilitated (#8).

ACKNOWLEDGEMENTS

The authors would like to acknowledge the input and vision of the personnel from Eco Rehab, in particular that of Dr J Booysen for his management of this project and Ms R Nel for her effort in compiling the database.

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A CASE STUDY ON OPTIMAL LAND USE OF SELCUK (IZMIR) AND ITS ARROUND

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When we look at the increasing environmental problems, we see that grand part of them because of wrong decisions of land use. In this sense, the unplanned cities result destroying of cultural and natural recourses and causes unwanted results like global warming, drought and climate changes in environment.In this research, they have been aimed land use decisions and interactions on the scale of developing county of Selcuk and its environs.

The scope -Selcuk (Izmir)- is one of the most important area with its natural, historical, cultural and touristic characteristics. There has been displayed wrong land use plan decisions and acted unconsciously. In the study field several important marshlands for habitats were dried out becouse of conversion to agricultural lands with low productivity. Marshlands around the lakes were diminished by drainage of Selcuk Plain. From several parts, the city has extended to the south where is arised alluvium. Furthermore, it is constructed main road in the middle of the wetland.

On the other hand, in the field they have been determinated some conflictons. Despite of its natural potential, coastal part of the area cannot be profited actively in terms of improvement of tourism. However it is determinated in last years, fields used for both forest and agriculture, cannot be utilized neither as forest nor for agriculture. Apart from these, many parts of the area declarated as protected areas regarding to their characteristics and to the degree of protection.

Beside socioeconomical, administrative reasons and also related to natural conditions, land use decisions have been made. Overlapping relevant maps of McHarg, evaluation criteria of Lyle and Dearinger were method of the research. GIS was used as a tool and obtained photogrametry in some parts of the study.

1- INTROCUCTION

1.1 Aims and Scope

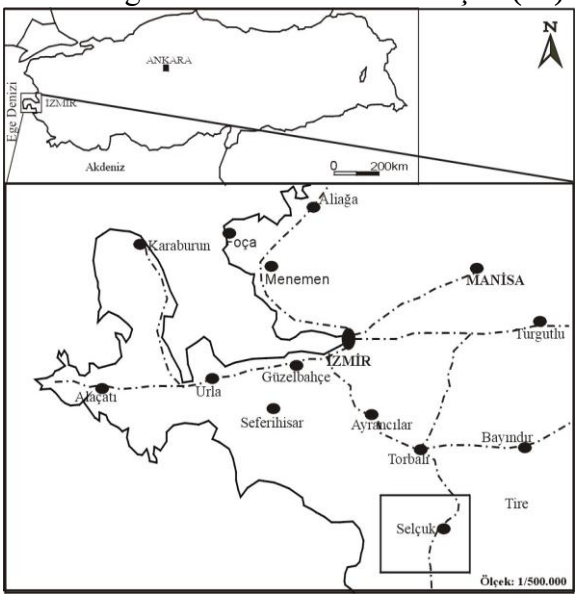
Displaying the factors -natural, cultural potential and administrative structure- affect on land use is the primer aim. Through the problems, necesities, priorities and alteration in the area, implementation of optimal land use with several proposals is aim of the study.

The study field is located western part of Turkey. It is covered by grand part of Selçuk Municipality. The scope is within the 522900-538800 East, and 4194300-4210700 North coordinates (1). Total study area has found 261 km square.

1.2 Natural Potential

As locating in Agean region and coastal zone, the district has typical characteristics of Mediterranean climate with mild, rainy in winter and hot in summer. Consequance of coastal side, it is arised by nautical affects. It's also observed that annual amplitude value is not significant (9).

Figure 1 Localization of Selçuk (23)



In the district they are somewhat determinated frosty. It has been exposed mild weather along the year **(**4). Beside this, first three minumum values were in February with minumum –5,8 °C level among last 30 years levels. However the maximum values generally occured in August, the maximum was 44 °C in August 2002**.** (9). It could be mentioned existence of quite hot seasons of last years (Table 2).

Table 1 Minumum Extreme Temperature (4).

YEARS	MONTHS												AVARAGE
1992-2001	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
	0.1	0.1	1.85	5	9.3	14.2	17.7	16.4	11.7	7.3	2.8	5.7	7.7

Table 2 Maximum Extreme Temperature (4).

YEARS	MONTHS												AVARAGE
1992-2001	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
	16.7	18.1	21	25.7	30.5	35.4	37	37	33.4	29.5	24	18.6	27.2

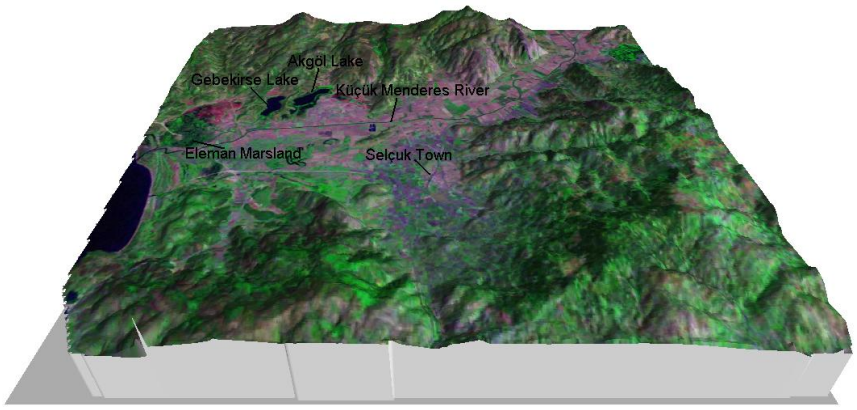
Regarding radiation peculiarities of the field, there is long term for sunbathing in the area. Respect of evapotranspiration values, the area has advantage due to radiation. The values are determinated too low in winter, initiate to rise in spring. Humidity rate has found high in winter, low in summer. (9)

Annual precipitation amount is 818,5 kg. Nevertheless distirubution of precipitation amount differ from seasons, so precipitations heavily occur in winter. In accordance with data of last ten years, in summertime it could be said nearly there is no precipitation or it has low values. Maximum amount of precipitation of 30 years implemented as 174,1kg. Apart from these, Western winds has prevailed in the area. (9)

Küçük Menderes Plain called from River Küçük Menderes is formed accumulation of aluvium removed by the river. It runs through Northeast and Southwest pertaing to tectonic lines in the stuctures surrounding Küçük Menderes Massive. The river flow into Agean Sea on the west where mentioned delta of Küçük Menderes. (23)

As surrounding the flat by high altitude from three parts and having many drainage ways, the topography is convenient and causes to overflowing to the river so and to the plain during winter period. For this reason the rota of the river has made changed.

Figure 2 Topograpy of the Area (3)



Despite of drying out some of aforementioned lakes in the are, some of fundamental lakes and wetlands are still exist. Two basic lakes in the disrtict are Gebekirse and Akgöl (Cakal). The lakes and also Eleman Marshland owing to be in wetland with in important habitats. Springs, groundwater and seawater are basic water recources that recharge the lakes and marshland. As an inference of litological specialities, the wetland receives few sediment. (13) Except Küçük Menderes river, Maden, Derbent and Alvari Streams have been determinated in the area, nevertheless they pass off near Kucuk Menderes.

The rocks of Menderes Massive underlain elevated topograpy,have high level of permability that charge the system . They perform northwest and southeast routed linearity. As a basic element of the scope, alluvium has widely extended in graben. Related to the intensity of tectonic lines on the plain, depth of the alluvuim has changed between 15-45 at the plain (13). On the other hand marbel and schist underlain as main types of rocks widespread north and south of the area. They are also implemented schist phyllite, mica schist, marble schist, marl claystone, Bornova Melange and volcanic rocks (11).

Figure 3 Map of Faultes, Drainage (1,3)

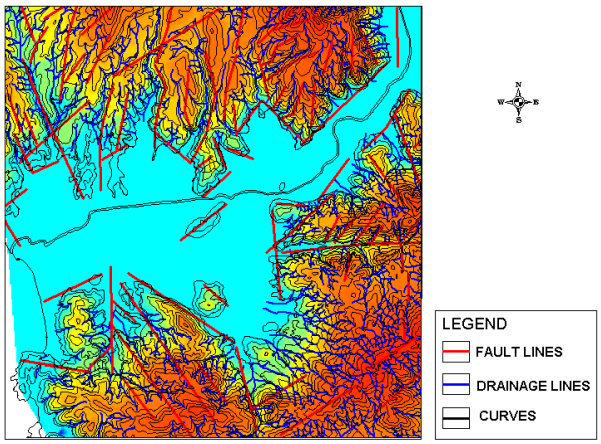
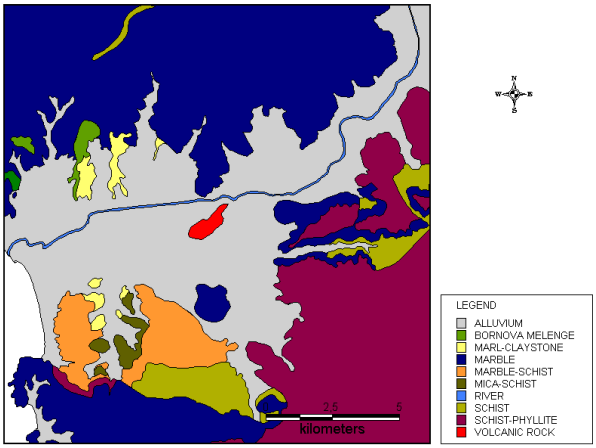
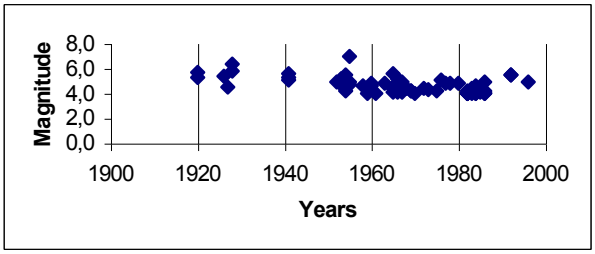


Figure 4 Map of Geology (11)



The field is on first level sysmic zone with quite active tectonic character. Around Selçuk there are found still active faults, due to this fact there have been numerous harmful earthquakes in the past and recently (13)(19). In the field there are displayed many faultes by using uncontrolled remote sensing.

Table 3 Distribution of the earthquakes with magnitudes according to years in Selcuk and its



around (13)

Consequences of climatoligal, litological and topographic characteristics, they are arised six types of soil are followed Red Brown Metirrenean soils (*Terra Rosa*), Noncalcic Brown Soils., Alluvial soils, Salinity Alluvial soils, Organic Soils and Colluvial soils (6). Mayor precantage of the soils- Red Brown Metirrenean soils - generally are observed under the maqiue and forest vegetation. Noncalcic Brown soils samely have been found under natural forest and maqiue. Alluvial soils distribuate much on the plain. These generally are used as cultivated areas. In coastal part these type of soil proceeds as Salinity Alluvial soils. Great part of these soils are utilized cultivated areas even though existing of problems of salinity. Colluvial soils appear adjacent of flat and drainage routes of high altitudes in the area. Organic soils take place north of the marshland.

Soils with classificationof first, second, third and fourth level, mostly extend on base of the plain. Fifth and sixth level soils have been found at sandy dune areas and under the maqiue and forests. Soils with seventh and eight level classification expand at sloppy places, coastal zone and maqui, forest and horticultured areas.

Figure 5 Map of Soil Types (6)

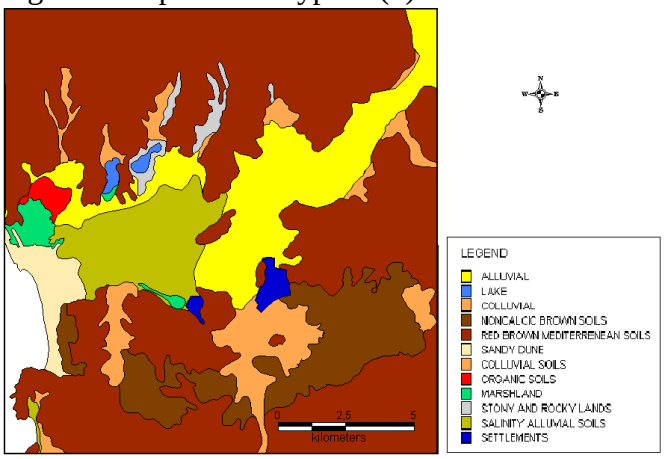
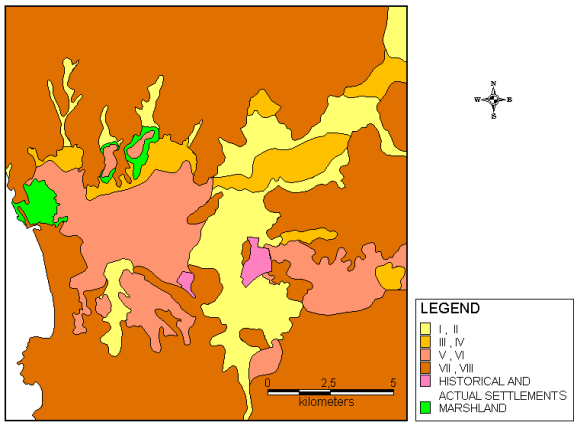


Figure 6 Map of Land Use Capability



One of crucial fact is the destruction of the natural vegetation. Actually it remnants around Camlik and Şirince village means partly south - southeast - east of the field. Apart from agricultural plants (*Veronica cymbalaria, Plantago major* etc.), the area basically has been covered three types of vegetation that forest, maquie and littoral vegetation. Forests display species of *Pinus pinea, Pinus brutia* etc. Maqiue with *Quercus coccifera, Arbutus unedo,*

Olea europaea and *Cistus cretius, Fumana arabica* of dumpy-droughty maqiue. The forest and maqiue vegetation have mainly been displayed on sloping topography with altitude. Maqiue is emerged from degredation of *Pinus brutia* forests.

Littoral and marshland vegetation expand coastal part of the area around Eleman marshland and sand dune in Pamucak coast. These types of vegetation differ from others due to being exceptional. Today many species of littoral vegetation have destructed but some of them could be given as examples *Ammophilla arenaria, Sporobolus virginicus*, *Tamarix parviflora* etc. Other fact is that aromotic plants have been exist in the area for more than 2000 years (15).

Among the three flora zone in Turkey, the scope is in Mediterranean flora zone includes drought resistant plant expandly. Significant natural biotopes have been detrimented pertaining to be active area since before Christ. (15).

The southern part of the area- around Selçuk town, Virgin Marry House location and Bülbüldagi Mountain- the number of the endemic taxa have been determinated ten. In accordance with researches on various habitats there, they have been observed 342 taxa. 267 of them are Magnoliopsida, 75 of them are Liliopsida taxa. Majority of these taxa are elements of Eastern Mediterranean and cosmopolite(15).

1000 ha area ambit of Eleman marshland and Gebekirse Lakes were declarated as Conservation Area and Generation of Aquatic Birds in 1985 and with overall status as Wildlife Conservation Area in 1994 (22). This region called Bird Paradise has also state of Natural Site with first level means it cannot be allowed by any of constuction in such as sites with first and second level.

Figure 7 Vegetation Map

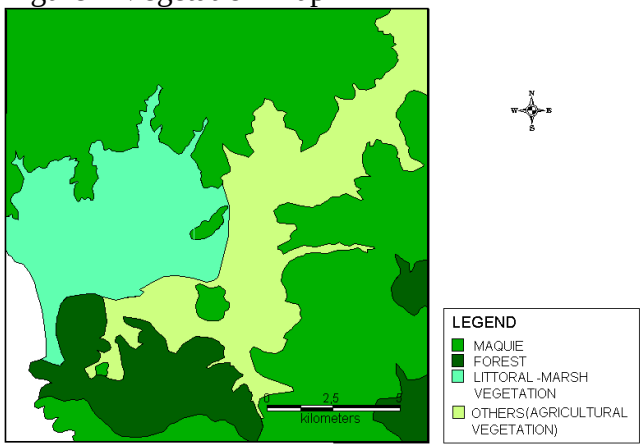
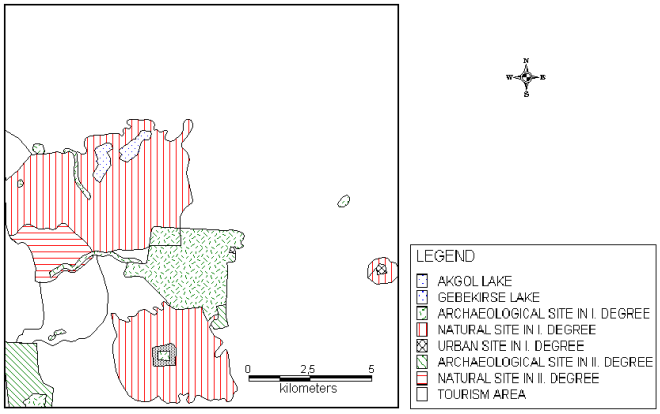


Figure 8 Map of Protected Areas (2)



The area is internationality important regarding to existince of aquatic birds and biodiversity. Gebekirse Lake is for billeting and is on immigration routes of birds come from Eastern Europe passing to South Africa. Among 38 familia 92 species of birds were obderved during 1984 and 1997 years. Other considerable group of fauna are mammals and fishes around the wetland. (22).

1.3 Actual Land Use Activities

Primer activitiy as a base of economy in the area is agriculture. 8694,8 hectares area is used for agriculture. They are displayed three sorts of agriculture in the field. Rainfed farmlands cover some places with cereals. Meanwhile, tobacco doesn't be cultivated since 2 years. Cultivated farmlands with irrrigation cover great part on the area with cotton, green plants, peach and citrus trees, also pomegranate trees in last two years. Horticultural lands expand widen with olive, fig, vineyard (8).

Cattle breeding has not occured much in the district. According to datas of municipality sign that into 12 177 agricultural population family, farmer family are 2706, farmer family occupied only with cereals are1760, farmer family occupied only with cattle breeding are 8, farmer family occupied both cattle breedings and cereals are 937. (4).

Owing to having many cultural potential the tourism have been triggered out positively comparing with past. Nevertheless the city cannot get obtain the advantage in related to daily visiting. Annual average of the visitors of Virgin Marry House is about 1,5 million (23).

Apart from these, they are displayed 10 otels with 3387 beds capasity certificated ministerial, and 23 otels with 1312 beds capasity certificated municipial. By the pensions totally, there are 5604 beds capasity in the study field (8).

The town extends in the middle of Selcuk Plain. Other settlements in the field are Zeytinköy, Şirince, Barutçu and Acarlar Villages. Selçuk town is far 74 km from Izmir city. Three main highways are standed out. The superhighway Aydin Kusadasi pass near the area. Other transportation of the field is railway.

Figure 9 Actual Land Use Map (8,3,23)

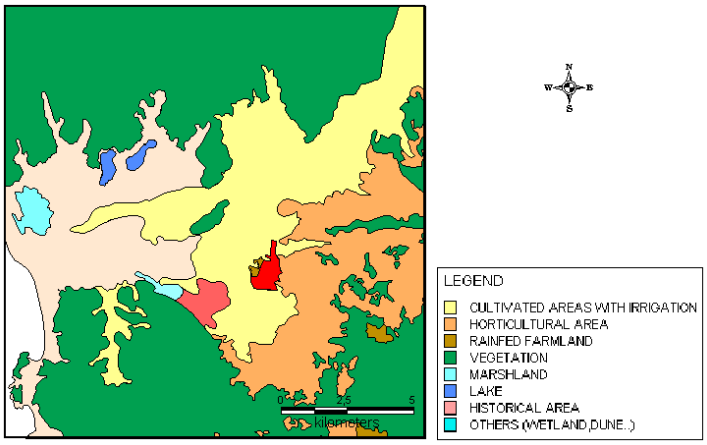
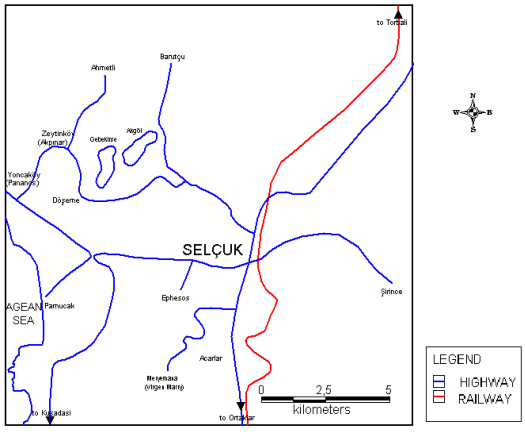


Figure 10 Transportation Map (7)



It can't be mentioned of considreable industry apart from several settlements of industries in sector of olive oil. Apart from these, there are many conservation areas. They have different special status. Basicly three types of protection are Natural Site in first, second and third degree, Archaeological Site in first and second degree, and Urban Site. Around wetland and east part of wetland had been declareted Natural Site in first degree. Around Virgin Mary house declarated as Archaeological Site in first degree. Selçuk Castel and its arround had been declareted as Urban Site. Apart from these, along the coastal region had been declarated as Turizm Region (23).

1.4 Cultural Potential

The town has 6000 years history. Many significant historic places are like evidence such as Antique City Ephesos, House of Mary, one of the Seven Wonders of Temple of Artemisian, Cave of the Seven Sleepers. Ephosos was localizated by the gulf, however it is now 5 km far from the sea in case of being carried of seddiments by Küçük Menderes River (23).

Regarding the demographic signs, the town has 25 265 population and remnant 2360 population live in the villages (4). During two term 1950-1960 and 1980-1990 annual avarage of population rate has increased heavily. This is becouse of immigration to the town more than amount of population increase. Eligibility of immigrated population is to work in agricultural sector. Meanwhile remarkable population subsist on agriculture but it cannot be said important activities of breeding cattle (18).

2- METHODS

After collecting data base on natural, cultural potential of the scope, terrestrial maps in 1/ 25 000 scale were digitalized, exceptly transportation maps on scale 1/ 100 000. Following maps topography, geology, soils, vegetation, protected areas, transportation and actual land use were digitalized and evaluated by using MapInfo 6.5 The map showing the faults was formed by means of uncontrolled Remote Sensing. The dranaige map and the map of altitude zones were derived from topography map and obtained satellite Landsat TM Mr. Sid view of 2002 years. It is also created the map of underground water table by using datas of the years 1998-2003 (5). Actual land use map has made from 1997 years data and it has been converted to actual land use of 2002 by Landsat TM Mr. Sid and by analyses at the field (9) (14).

In process of evaluation of the data, the methods used by McHarg (21), Lyle (20) and Dearinger (12) were uniformed recording to aim of the research. Potential land use map were determinated such as Protected areas, Forest, Agricultural fields, Recreation and Settlements. Meadows and grasslands and industrial settlements haven't been estimated due to the slight existence of such kinds of land uses. Acording to socioeconomical factors and ecological sustainability, potential land use map reevaluated as suggested land use. Before reach of potential land use map, relationships between natural potential and land use were brought up. Into natural potential such as soils etc. were displayed elements (dranaige etc.) of themselves that related to land use. For every land use, elements of natural potential divided to subelements (ineliable or eliable) and given them value considering to stress of relationship.
Potential land uses were classified in four degrees. Very suitable, suitable, moderity suitable and unsuitable. Then optimal land use plan has been pointed out superimposed all the land use maps. In this stage, it has been appreciated natural potential, past and present land use.

Table 4 Agriculture

Natural Factors	***Subfactors***	***Value of Subfactors***
Land use capability	I, II III, IV V,VI,VII,VIII	2 1 0
Drainage	efficient not efficient	3 0
Erosion	Slight Moderate Intense	3 1 0
Profundity of soils	Profound Moderate Not Profound	3 2 1
Slope	%0-5 %6-10 %11-20 %21<	3 2 1 0
Altitude Zones	0-250 250-500 500-750	3 2 1
Actual Vegetation	Out of forest,maquie,littoral Forest, maquie, littoral	3 0

Table 5 Settlements

Natural Factors	***Subfactors***	***Value of Subfactors***
Land use capability	VII, VIII V, VI III, IV I, II	3 2 1 0
Drainage lines	>50 metres <50 metres	3 0
Geology	Other rocks Alluvium, colluvium	3 0
Fault lines	>50 metres <50 metres	3 0
Slope	%0-10 %11-20 %21-30 %31<	3 2 1 0
Altitude Zones	0-250 250-500 500-750	3 2 1
Actual Vegetation	Out of forest,maquie,littoral Forest, maquie, littoral	3 0

At the stage of evaluation of the data, Sibel Mansuroglu's 1997 doctorate thesis has been used for interpretations(17)

Table 6 Forest/Maquie

Natural Factors	***Subfactors***	***Value of Subfactors***
Land use capability	VII, VII III, IV, V I, II, VIII	3 1 0
Profundity of soils	Profound Moderate Not Profound	3 2 1
Drainage	efficient not efficient	3 1
Erosion	Intense Moderate Slight	3 2 1
Slope	%41 %21-40 %20-0	3 2 1

Table 7 Protected Areas

Natural Factors	***Subfactors***	***Value of Subfactors***
Erosion	Slight Moderate Intense	3 1 0
Slope	%0-10 %11-20 %21<	3 2 1
Altitude Zones	500-750 250-500 0-250	3 0
Drainage	efficient not efficient	3 1
Transportation	Accessible No Accessible	3 1
Hidrology	Exist No Exist	3 0
Actual Vegetation	Out of forest,maquie,littoral Forest, maquie, littoral	3 0

Table 8 Recreational Areas

Natural Factors	***Subfactors***	***Value of Subfactors***
Historical Site	Exist No Exist	3 0
Natural Site	Exist No Exist	3 0
Actual Vegetation	forest, littoral veget. maquie	3 2
River Resources	Profound Moderate Not Profound	3 2 1
Wetland	Exist No Exist	3 0

3 Very Suitable 2 Suitable 1 Moderate Suitable *0 Unsuitable*

Protected area suitability were reserved *protected areas*. Except the protected areas, the areas that have more suitable degree than others were chosen. In the case of same suitability degree, the priority was given to areas regarding to LYLE's preferential grading (20).

1. Protected Areas (wetlands)
2. Forest
3. Agriculture
4. Recreational Area
5.Public institutions
6. Transportation
7. Settlements
8. Others
9. Industry

At the stage of suggested land use, the decisions considering to several legal status in terms of special protection levels and shortage of natural vegetation were taken. For instance, the status on sustaining of maqui vegetation was suggested becouse of the matrix and proposal of convention to forest in the future. Even though Southeast part of the area-tourism region- is apropriate for forest, it is suggested as tourism region in accordance with socioeconomic and legal status but under the protection.

3- RESULTS AND RECOMMENDATIONS

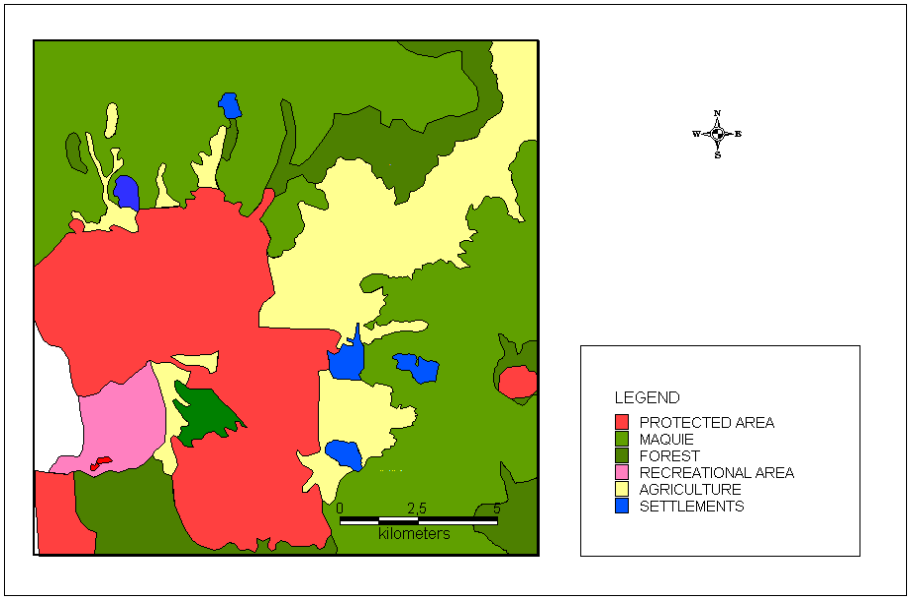
On suggested land use map, new settlements or expand of settlements are generally proposed on the soils with classification of fifth, sixth level without vegatation, unsuitable for agriculture etc. However, present settlements are sustained and apart from their natural and social characteristics propesed settlements are determinated at areas 50 m.far from the faults lines.

Considering to rapid growth of the town area, disposal should have planning of new areas before encroaching new areas by people all along. At this point, it is thought another general national problem that it is needed prevention of remission on illegal settlements.

Table 9 Change rate date of the town area

Years	**1979**	**2006**
Urban Area (m²)	811 896	3 266 039
Change rate 4.03 times		

Figure 11 Proposed Land Use Map



According to its geological ground survey and being on first level seismic zone including active faults, settlements of the actual town should't construct more than 2 or 3 floors due to alluvium ground characteristics. In the case of extension of the city at eastern side, settlements on ground with schist phyllite shouldn't have more than 2 or 3 floors but on the marble ground it should be not more than 3 or 4 floors.

Being drilled of numerous wells and overpomping of groundwater in the alluvium plain deteriote of water quality and cause to salinity in potable water. At the same time it becomes a problem in terms of salinity on the soil. Consequently vacant, barren, infertile, useless lands would appear in the future. Another indicators of climate that decrease of precipitation amount and increase of tempreature values in last years support the vitality of soils that formed by factors of former and latter.

Many of horticultured areas -ambit of Sögütçük and North of Şirince town -occupy on soils with classification of seventh, eighth class and they spread out on sloppy patches. These areas have suggested as maqiue to be convent to forest in the future as indeed not being able to utilize such places neither maqiue nor for horticulture due to soil problems such as stony, shallowness etc.

Great part of the soils with classification of fifth and sixth level are occupied by agricultural fields with low productivy becouse of salinity and drainage problems. On these types of soils are made cultivation with irrigation.

Significant priority could be given to reforestration of the sloping, infertile, problematic areas with erosion and drainage. In such places it shouldn't let grazing.

Though it's illegal to hunt around wildlife conservation area, several hunting are displayed. Separately, construction of highway passed in the middle of the wetland cause to fragmantention of habitats so that equilibrium of ecosystem there. At least habitats would be deteriorated by noise and pollution derive from the vehichles. Plan makers both in ministeries and local institutions would take attention on tendency of ecosystems and would make plan scennerios releated to results of a new land use before application of it .

Due to getting agricultural fields and the idea on prevention of malaria disease, from 1930 year's till 1986 about 190 000 ha wetlands have been dried out (17). At this term, loss of some wetlands through flooding of Cevaşir, Gümbüldek, Sirainler, Bodrum and Canak lakes and marshlands have occured by same way in study district (16). The wetland is still under the threat in some point of view such as submittion for Formula 1 near Bird Paradise on sand dune vegetation.

Apart from visual influence of littoral vegetation, some researches have displayed function of littoral vegetation obviously. Littoral vegetation of a lake controls exchanges of nutrients, sediments, and other contaminants between terrestrial and aquatic systems, and affects pelagic production ana sedimentation. Its effects on lake ecosystem can be both direct through uptake ana biological transformation, and indirect by influencing hydrodynamic processes (e.g., circulation, thermal stratification, and sediment re-suspension) (24). As consecuence of these, not only littoral vegetation but also all wetland to which related habitats are under the threat by implementation of new sprawled agricultural activities just around the lakes and by grazing partly. Legal status only pertaing to prevention of constructions on natural site with first and second level can not be presume sufficient to remove the detriment of ecosystem there.

Pollution of Kucuk Menderes River directly by industrial wastes from other counties, sewages are impressive problems as a result of fish deaths. By convention of Ege University and Faculty of Fisheries Department of Hidrobiology **,** water analysis of the river has displayed by results from three points of the river. It emphasizes exisiting of high parameters of pollution by heavy metals and demand for chemical and biological oxigene.

Another similar reason for pollution is the way of refining industry follows that inadequate. It's fact that after the process in precipitation land of household wastes, turning them back tok the river is ineligible. This pollution would cause to soil contamination, affect on the hidrojeological system and sustainability of habitats there in long term.

Advantage of the Lakes and good viewpoint of Zeytinköy village, it would be improvement of ecotourism around it and several activities with limited applications such as riding could be considerable. Wine industry special to Şirince Village would be generalized to all scope.

Forest fires in 2006 summer caused to lose of 350 ha *Pinus brutia* forest in Selcuk Municipality. This great dramatic amount is rather impressive for accelerating controlls and strict measurements not to overlook forest fires caused by human for agricultural activities.

Construction of the harbour would provide an advantage to the town by means of accomadition of tourists and increase of tourists. As a result, in the study field there have been taken land use decisions so that their affects sustain in aspect of transformation of natural, cultural ecosystems, and especially change in quantity of them. To obtain the potentials of the area in long term, it is needed collaboration of administrative institutions, local institutions and people with convenient regulations in development.

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DEFINING LAND COVER TYPE OF EDREMIT REGION IN TURKEY BY USING OPTICAL AND RADAR FUSED IMAGES

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Although obtaining high-resolution images with the new generation satellites is an important advantage, there are still problems in defining and mapping land use/cover types by using conventional remote sensing techniques. For the fields having different topography and soil features as well as having various types of crop textures, the success of remote sensing techniques is not satisfying yet. This research aims to improve the accuracy of land cover maps of Ege Region. For this purpose, contribution of SAR images to optic images in defining land use types was investigated. The 4,5,3-band combination of Landsat-5 images and Radarsat-1 images were fused and land cover types were defined from fused images. Results were compared with the classified Landsat images, which are commonly used to define land cover types. The research was conducted in Edremit Golf where the topography is a mixture of flat, slope and high relief areas in that region. Land use type was defined in 9 groups and according to the statistics of evaluations, fused image gives better results. Average accuracy is 91.14%, and 8.58% improvement was gained in comparison to classification results of Landsat 4,5,3 band combination. According to the ground truth, the accuracy is 81.20% with an increase of 6% compared to the classification of Landsat.

Key Words: *Landsat-5, Radarsat-1, land use/cover, classification, image fusion*

INTRODUCTION

To protect the ecological balance and meet the demands of growing economy, it is necessary to use natural resources carefully, to locate new natural resource deposits and to determine the inventory of them. For the last two decades, remote sensing techniques are used successfully for mapping earth surface features especially for land cover mapping. It is a powerful tool for the regional mapping of natural resources. Since the early stages of development of remote sensing in the mid seventies, a huge progress has been achieved. However depending on the user ability and image properties there are some restrictions for using remotely sensed data. The challenge of monitoring agricultural resources is further complicated by their dynamic nature. Since crop type varies from field to field and from one season to the next, it is even more significant. Although the capability exists, there are still some limitations in operational implementation of an agricultural monitoring system based on optical imagery. Using only optical images or SAR images is useful only defining some of objects. Although, with their good resolutions new generation satellite imagery has yet began to progress, remote sensing techniques are not as successful as expected in monitoring agricultural resources in vast acreages with different slopes, which has different soil types and different crop patterns. Generally obtaining better accuracy is main target in mapping and classification of objects.

However frequent revisit schedule of earth observation satellites compounded with the obstruction of data collection as a result of cloud cover has been a significant impediment. On the other hand, all weather capability of Synthetic Aperture Radar (SAR) means that the reliability associated with the collection of earth observation data can be generally enhanced (Mc.Nairn, et.al, 2002). Since optical and microwave sensors respond to very different characteristics, their role in crop monitoring can be viewed as complementary.

Usually conventional multispectral classification methods, which make use of spectral response of ground objects, are used for thematic mapping. Basically, the spectral vector of a pixel is used to classify the pixel by using a classifier. These per pixel classification approaches often result in mixed pixel classification for low resolution images such as Landsat ones. Since a wide spectrum of data can be available for the same site observed, additional sources may provide complementary data, and fusion of different information can produce a better understanding of the observed site. Information provided from an individual sensor can be incomplete, imprecise and inconsistent. Therefore fusion of multispectral, multipolarisaton and multitemporal data may decrease the uncertainty related to the single data sources (Simone, et al., 2003). Genderen and Pohl (1994a,b), Wald (1998), and Pohl (1996), described image fusion as the combination of two or more different images to form a new image by using a certain algorithm to get more information. The potential of fused SAR and Optical data for providing crop information and land use classification were discussed broadly by Mc.Nairn (2002) and Kuplich (2000).

In this study, we aim to improve the accuracy of land cover maps of the Ege Region. For this purpose, contribution of SAR images to optical images in defining land use types (natural products and textures) was investigated. The 4,5,3 band combination of Landsat-5 images and Radarsat-1 images were fused and land cover types were defined from fused images. Due to the limitations such as low resolution, low density, atmospheric conditions or being identified in the same spectral region with olive, forest and scrub areas, it is difficult to produce vegetation maps from optical images. Therefore it is also aimed to define vegetation type including forest, scrub, pasture, olive fields etc. as permanent plant cover and wheat, cotton, etc. as annually cultivated plant cover, which could not be recognized in optical images due to the low density and due to the other restricting parameters. Because in such cases the error propagation is over limits. Therefore, in order to determine the use of Radarsat images for defining objects, this study aims to compare the results of classification of Landsat-5 images with the classification results of fused Radarsat-1 and Landsat-5 images.

STUDY AREA AND DATA

Research area includes lands to the north of Gulf of Edremit lying in the northwest of Turkey (Figure 1). There are nearly flat areas in a valley, which extends towards the gulf induced from flooding of the Edremit River. Flat areas are surrounded by slopes that are formed of magma and sediment rocks from the south and the north. Land cover of slopes is formed of forests, scrub, pasture and olive trees whereas flat areas contain agricultural fields mainly of annually plants and olive trees. Annually planted areas are dominant in flat surfaces lying across a delta formed by the Edremit Golf. Circuits and the olive growths are also included in these areas.

Villages, dissected small settlement area and their connection roads also take a place in research areas as a class. Olive growth, forest, brush shrub land, pasture covered areas are mostly located on gentle slopes and sloppy areas with different coverage and stoniness. Stoniness of the soil for olive growth areas, similar spectral reflectance of scrubs and olive trees as well as mixed scrub and olive growth areas cause difficulties in mapping of land use types correctly only with the aid of optical images (Figure 1 a,b,c,d,e,f). The Landsat 5 images of the area were gathered in 2002. The pixel size for these images is 30m × 30m and cloud cover is less than %10. A composite image was generated from the 4,5,3 band combination of Landsat-5 images. Two fine beam mode images of Radarsat-1 gathered in 2002 were examined. It is due to the fact that these data had the necessary special resolution and incidence angles for evaluating the sensitivity to within field crop variability. Radarsat-1 images are in SAR PRI (precision image) format with 6.25m × 6.25m pixel resolution.

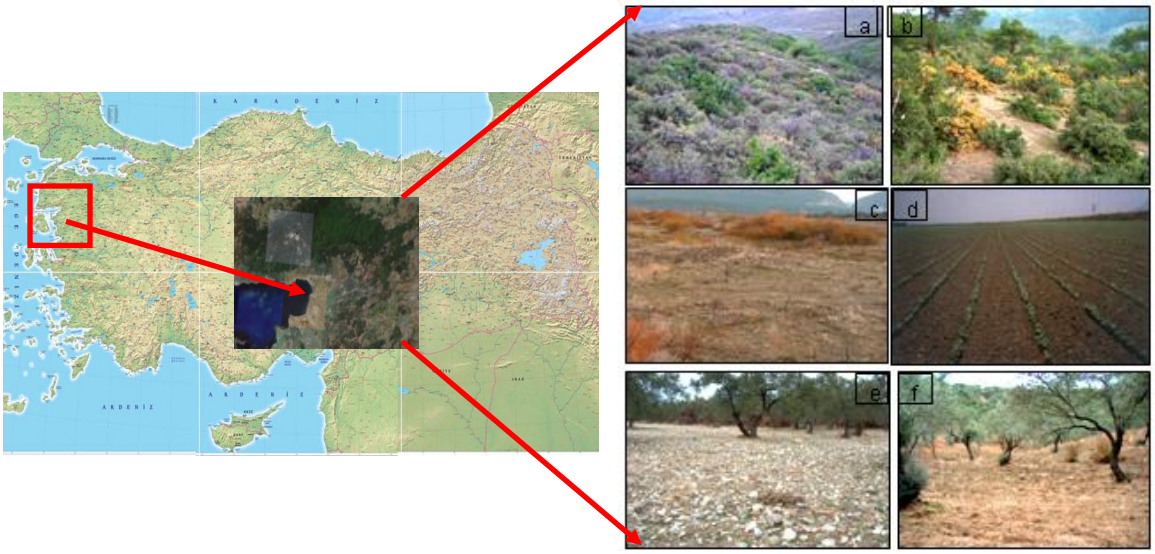

Figure 1. Location map and land cover of study area; (a) scrublands, (b)forest& scrubland, (c) river bed, (d)cotton planted area, (e) and (f) olive growth with stony surface and sloppy soils

METHODOLOGY

A reference digital topographic map was generated from 1/25000-scaled standard topographic maps and used as a base map for the rectification of satellite images. Satellite images were orthorectified by using digital elevation models (DEMs). They were geometrically corrected to the coordinate system using the Universal Transversal Marcator Projection System with a root mean square error of less than 1 pixel. Land use/cover types of the study area were determined from the fused image of Landsat-5 and Radarsat-1 and from only Landsat-5 images by applying supervised classification to see the contribution of radar images to optical images for defining land use maps (Figure 2). In this way, intensity of the SAR image and hue and saturation of the Landsat image were combined in to a new image (Figure 3).

Prior to defining land use types from satellite images, basic image processing steps of atmospheric correction and enhancement were applied. A supervised classification algorithm was applied on the images to determine the land use types. Classification result of the fused image was compared with the classification results of Landsat-5 image to see the contribution of Radarsat-1 image. Research area was investigated carefully before applying supervised classification to the fused images and Landsat-5 images.

An unsupervised classification process was applied to Landsat-5 images to create a draft map of crop types. Fieldwork was done to determine the mixing plant types and land use types using the draft crop type map. During the field works, properties of crop types were determined by using a hand spectrometer, and a database was created. The topography, soil cover and the vegetation type were defined by doing several fieldworks. Land use types, soil features and geographic locations were assigned to the test areas defined. Thus, in the research area, land use types were defined in 9 groups as forest, scrub, pasture, olive fields, annually cultivated plant cover (wheat, cotton, etc.), residential areas-roads, sea, river base and bare soil. By using information gained from the fieldworks a supervised classification algorithm (Para ML) was applied and a land use map was generated from both Landsat-5 images and fused images. Accuracy assessments of classifications were done. Afterwards, two land use maps were compared using ground truth checks. After finalizing the processes of classification process, random points were chosen for ground truth checks by a fieldwork.

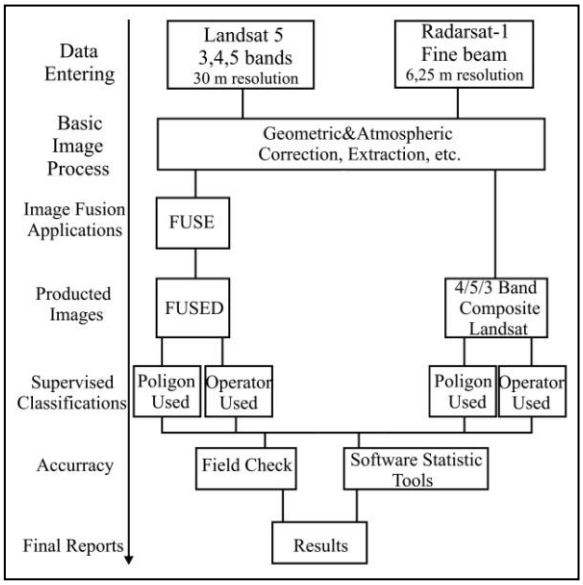

Figure 2. Flowchart of the study

Image Fusion

In this study, a pixel based image fusion technique was applied to combine images. By using Data Fusion Module of PCI Geomatica software, the Radarsat–1 image with 6.25 x 6.25 resolutions was fused with a 4,5,3-band combination of Landsat–5 (Figure 3). Since image fusion presumes an accurate image rectification, Radarsat-1 and Landsat-5 images were geocoded to avoid artificial features that may affect image interpretation (PCI, 1998). SAR images were corrected for the topographic effects due to the local high relief variations. Due to the local mountainous characteristics, Radarsat images were highly affected by topographic distortions. Especially steep slopes of the terrain caused layover and foreshortening effects. Radar images were geocoded to the UTM projection system by a complex process using a digital elevation model and satellite parameters.

Running the FUSE tool of PCI is similar to running IHS and then RGB. Landsat-5 4,5,3 band combination was separated into three color space components as intensity, hue and saturation. Then each was placed in a separate channel. By using the hexacone model and bilinear interpolation for data fusion, the intensity channel was replaced with a Radarsat-1 fine beam image. The RGB program was then used to convert the intensity and hue and saturation channels output by IHS back to red, green, and blue channels.

As a result, a new 3-band composite image was generated, which has the intensity from the Radarsat and hue and saturation from Landsat images for each band. In this application, Radarsat-1 image that has the 16 bit radiometric resolution was scaled to the radiometric resolution of the 8 bit Landsat-5 images, and geometric resolution (30m×30 m) of the Landsat image was resampled to Radarsat image (6.25m×6.25m) resulting in a fused image. As a result of the fusion, especially in the 3rd band, earth objects became more sharpened which helped operator to recognize objects better during the classification process (Figure 3d).

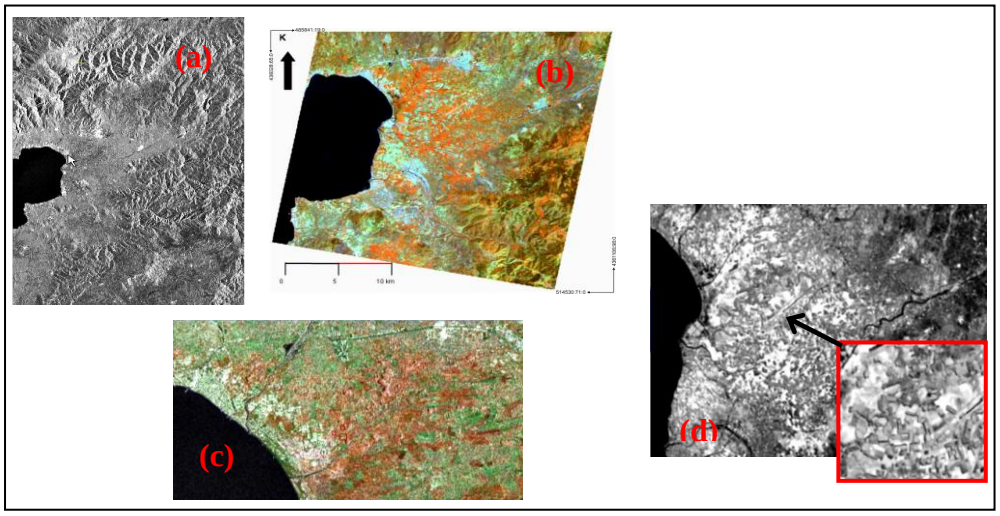

Figure 3. Fusion process of the study area (a) Radarsat-1, (b) 4,5,3 band composite of Landsat-5; (c) resulting RGB channels of Radarsat-1 and Landat-5 images; (d) a band of the fused image

Land Cover Classification

In order to determine the use of Radarsat images for defining the land use/cover, at first unsupervised classification process was applied to 4,5,3 band combination of orthorectified Landsat-5 images to create a draft map of crop types. Field work was done to determine the mixing plant types using that draft map of crop types (land cover). Sample sites were chosen within a field as the representative of the surrounding crop area. During the fieldworks, properties of crop type were determined by using a hand spectrometer, and a database was created. Since the acquisition was supported by a hand GPS, the points and polygons were located on Landsat-5 4,5,3 composite images. The topography, soil cover and the vegetation type were defined by these fieldworks.

To compare the results of classifications, two different methods were tested in a supervised classification employing user defined training sets for each image group individually and using the same polygons determined in the field works. In the former, the user defined training areas according to the field observations and ancillary data. In the latter, for defining signature instead of using region growing or polygon drawing tools, an existing polygon vector layer was used in order to make certain the same training set is used for each group of images. For each image combination the same data set was used for both the design of classifier and evaluation of classification results. Than Maximum Likelihood Para ML supervised classification technique was applied on both Landsat-5 images and the fused (Radarsat-1 and Landsat-5) images. Esetlili et al. (2002) studied on the accuracy of supervised classification methods to define the land cover types for vast acreages in the region and revealed that Para-ML gives the best results. Para-ML technique is a synthesis of parallelpiped and maximum likelihood classifications. Rather than assessing absolute probabilities of correct classification capacities of used images, this study is assessing the relative accuracy of image groups with a certain classification methods and training sets. The differences between the classification results can be seen in Figure 4. Fused image classified by operator defined training area results in better land use/cover map due to the less mixture of olive growth areas with other classes (Figure 4b).

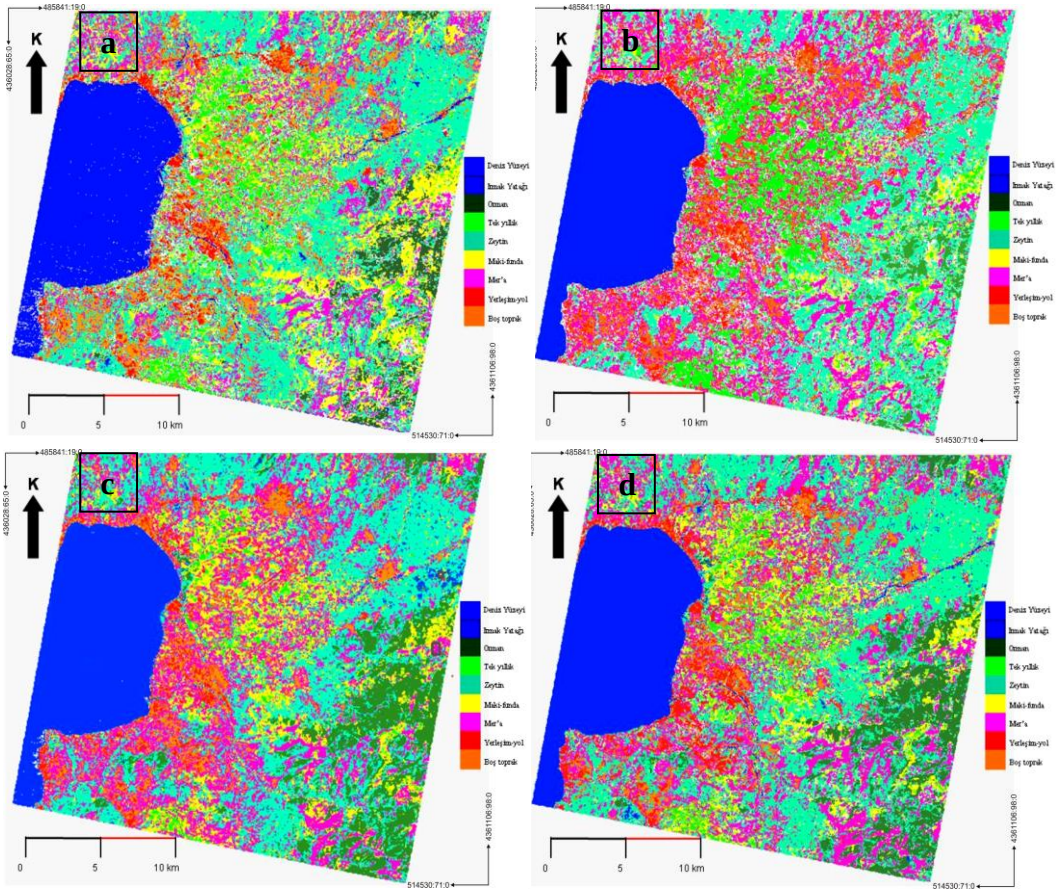

Figure 4. Classification results by operator defined training sets for (a) Landsat-5and (b) Fused (Radarsat-1+Landsat5) image. Classification results using existing polygons for (c) Landsat-5 and (d)Fused (Radarsat-1+Landsat5).

Accuracy Assessment of Classifications

Accuracy assessment was done to depict the degree of correctness of classification by the statistic analysis of the software used and the ground truth control. By using confusion matrixes average accuracy and over all accuracy was compared for each image groups as well as the ground truth. Beside the overall accuracy of classifications, Kappa coefficient was calculated and compared (Table 1, 2). Because, successive evaluation of the results by means of confusion matrices and the Kappa coefficient allowed for a direct assessment of the classification capacity of the channels in question (Lillesand and Kieffer, 1994). In contrast to the overall accuracy, the Kappa co-efficient accounts for errors of omission and commission and effects of chance agreement. The Kappa coefficient is thus considered a more robust indication of classification accuracy. For ground truth analysis, 266 test points were chosen randomly from the land use map generated by taking in to account the distribution of points which were available to finish field checks at most in 3 days of fieldworks. These test points were observed in the field and compared with the land cover maps generated from Landsat-5 images and the fused images. According to the number of correctly matching and mixing points statistical ground truth accuracy was done (Table 1, 2).

Results and Discussions

Among the all groups; sea surface, olive growths, pasture and forest have larger surfaces. The results of classifications applied on Landsat-5 and the fused images by using user defined training sets and polygons were compared. From the land cover maps, the locations of mixing classes were defined. A small part of zoomed classified images are shown separately per each classification result in Figure 5 to show the differences between the classified land cover types according to applied classification process. In Figure 5, it is seen that scrublands and per annual plants in the same region of the sturdy area were classified in to different classes for each images.

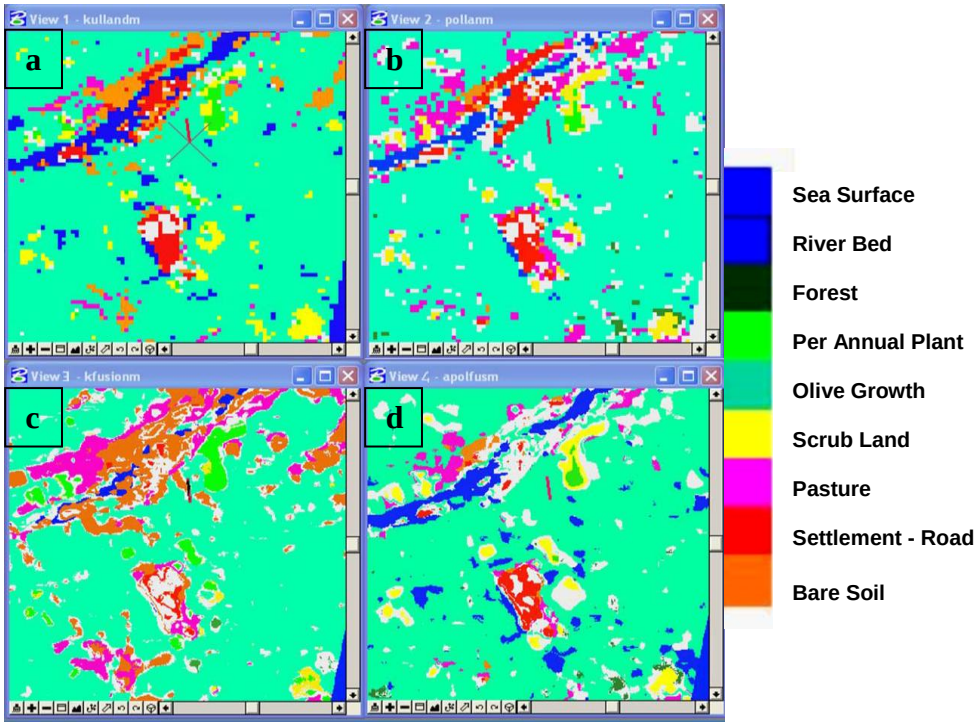

Figure 5. A small part of classified images; Landsat images a) by operator defined training set, b) using existing polygon, Fused images c) by operator defined training set, d) using existing polygon

The best classification technique was defined after applying ground truth checks for all classification results. It was observed that mixing percentage of scrub land and per annual plants was the highest in all classification results (Figure 5). As well as having similar plant-height, density and leaf area, their similar reflection properties caused high mixing percentages.

Accuracy Assessment of Classifications by Operator Defined Training Sets

According to classification results of Lansat-5 4,5,3 band combination, sea surface and forest classes have the highest user (average) accuracy with 94.77% and 93.70% respectively whereas the lowest accuracy belongs to the classes of scrubland and olive growth with 70.71% and 64.51% respectively (Table1a). The results show that olive growth areas can not be defined from the land use map produced by operator defined training sets using Landsat images (with 30 m × 30 m resolution). On the other hand, these images can be employed to map the boundary of forest areas effectively. Since the coverage of olive growth areas are around 50 % or lower in that study area, we have failed classifying olive growth areas successfully. The fact that olive growth areas have lower coverage causes the other factors such as slope, soil stoniness, moisture content and texture contribute to the reflection more. Thus, this results in a confusion of olive growth classes with the others. It has also been detected that olive growth areas were confused with pasture classes at a level of 25%, with the classes of scrublands and per annual plants 26 %, and with the bare soil class 10 %. The performance of classification with fused images of RADARSAT-1 fine beam and Landsat-5 4,5,3 band combination has been found the most successful compared to the other classification results. The user (average) accuracy is higher than 90% for the 7 out of 9 classes (Table1). The lowest user accuracy is 67.8 % belonging to the bare soil class. It was detected that bare soil class was confused with settlement areas and road class at 21.4 % level. This confusion can be accepted since both bare soil areas and settlement and roads have similar textures. One of the most important results of this study is the determination of olive growth areas with an average (user) accuracy of 97 % level using fused images of Landsat and Radarsat. The contribution of RADARSAT Fine Beam images is clearly seen from the results of fused image classification in Table 1b.

Table 1. Classification accuracy results for (a) Landsat-5, (b) Fused (Radarsat-1+Landsat5) by operater defined training sets

Class name	Reference totals	Classified totals	Number correct	Producer Accuracy (%)	User Accuracy (%)	Number of Ground Truth Points	Number of Matched Points and %	
(a)								
Sea Surface	17786	16855	16855	100.00	94.77	16	15	93.75
Per Annual Plant	543	466	440	94.42	81.03	29	26	89.66
Forest	492	462	461	99.78	93.70	20	19	95.00
Scrub Land	99	167	70	41.92	70.71	27	16	59.26

Table 1. Cont.

Pasture	98	203	80	39.41	81.63	29	14	48.28
River Bed	81	593	69	11.64	85.19	20	15	75.00
Settlement - Road	124	137	109	79.56	87.90	39	34	87.18
Olive Growth	479	344	309	89.83	64.51	57	37	64.91
Bare Soil	219	208	183	87.98	83.56	29	24	82.76
NULL		486						
Totals	19921	19921	18576			266	200	75.19
(b)								
Sea Surface	268453	268041	268041	100.00	99.85	16	15	93.75
Per Annual Plant	8472	7966	7914	99.35	93.41	29	27	93.10
Forest	3877	3770	3770	100.00	97.24	20	19	95.00
Scrub Land	1448	1632	1364	83.58	94.20	27	17	62.96
Pasture	1276	1537	1207	78.53	94.59	29	20	68.97
River bed	371	361	361	100	97.30	20	15	75.00
Settlement - Road	3236	3561	2675	75.12	82.66	39	30	76.92
Olive Growth	3054	2974	2966	99.73	97.12	57	48	84.21
Bare Soil	4125	3136	2800	89.29	67.88	29	25	86.21
NULL		1334						
Totals	294312	294312	291098			266	216	81.20

Note. Overall classification accuracy is 93.25% for Landsat-5, 98.91%, for FUSED (Radarsat-1 + Landsat-5) Image

Kappa classification accuracy 74.00% for Landsat-5, 79.00% for FUSED (Radarsat-1 + LAndsat-5) Image

4.2 Accuracy Assessment of Classifications by Using Existing Polygons

According to classification results of Lansat-5 4,5,3 band combination by using existing polygon, sea surface and forest classes have the highest user accuracy with 94.80% and 93.20% respectively (Table2a). Olive growth areas were determined at a level of 84.76%. It was confused with pasture class at a level of 8%, which was higher than fused Image classifications by operator defined training sets. It has been detected that per annual planted areas have been confused with scrubland classes at a level of 15.4 % and also per annually planted area class has one of the lowest accuracy with 81.77 % , which is followed by olive growth areas with an accuracy of 67.96 % level.According the results of Radarsat-Landsat fusion image classifications by using existing polygon, see surface and forest have the highest user accuracy with 99.39% and 94.12% respectively as it was same for the other classification results. In this classification, olive growth class has been determined at a level of 82.04%, which also proves the contribution of Radarsat images to the accuracy of calssification.

The pasture and bare soil classes were confused with olive growth class since the coverage of olive growth areas were lower in some part of study area. Average user accuracy and overall accuracy were found 83.79% and 90.90% respectively for this classification method.

Table 2. Classification accuracy results for (a) Landsat-5, (b) Fused (Radarsat-1+Landsat5) by using existing poligons

Class name	Reference totals	Classified totals	Number correct	Producer Accuracy (%)	User Accuracy (%)	Number of Ground Truth Points	Number of Matched Points and %	
(a)								
Sea Surface	12351	11710	11709	99.99	94.80	16	15	93.75
Per Annual Plant	883	850	722	84.94	81.77	29	24	82.75
Forest	1543	1446	1438	99.45	93.20	20	19	95.00
Scrub Land	465	485	316	28.04	67.96	27	8	29.63
Pasture	822	876	692	78.99	84.18	29	26	89.66
River Bed	91	362	86	23.76	94.51	20	17	85.00
Settlement - Road	322	294	258	87.76	80.12	39	29	74.36
Olive Growth	1693	1554	1435	92.23	84.76	57	41	71.92
Bare Soil	451	495	390	78.79	86.47	29	24	82.76
NULL		549						
Totals	18621	18621	17046			266	203	77.44
(b)								
Sea Surface	153944	153400	153001	99.74	99.39	16	16	100.00
Per Annual Plant	26762	27106	22779	84.04	85.12	29	25	86.21
Forest	42124	39957	39647	99.22	94.12	20	19	95.00
Scrub Land	14532	14082	9511	67.54	65.45	27	13	48.15
Pasture	24953	25012	20860	83.40	83.60	29	25	86.21
River bed	3017	5346	2353	44.01	77.95	20	19	95.00
Settlement - Road	12487	12726	10828	85.09	86.71	39	29	74.36
Olive Growth	49489	44017	40104	91.11	81.04	57	45	78.95
Bare Soil	15323	15968	12359	77.40	80.66	29	24	82.76
NULL		5017						
Totals	342631	342631	311442			266	215	80.83

Note. Overall classification accuracy is 91.54% for Landsat-5, 90.90.%, for FUSED (Radarsat-1 + Landsat-5) Image

Kappa classification accuracy 73.00% for Landsat-5, 78.00% for FUSED (Radarsat-1 + LAndsat-5) Image

Among the alls comparisons of classification methods show that classification of fused images by using operator defined training sets has the highest overall accuracy (Table 1b).

Analysis of Ground Truth Accuracies

In this research for ground truth analysis, 266 test points were chosen randomly from the generated land use map. The ground truth analyses with respect to the classes and randomly distributed ground truth points falling in to 9 different classes are given in Table1 and Table2. For the classless of forest and sea, the selected points from both Landsat and Fused classified images match with the ground truth at a highest rate. The 19 out of 20 points and 15 out of 16 points matched to the classification results correctly for forest and sea classes respectively. For the annually planted vegetation class the highest rate was obtained for the fused images. 27 out of 29 selected points correctly match to the ground truth. The worst results were obtained for scrub classes since the scrub class is usually mixed with the class of annually planted vegetation. The olive yard has the highest economical value in the region, and using fused images 48 out of 57 points (84%) were classified correctly for this land cover. As seen from Table 1, the results obtained from fused images are better than that of Landsat images for the classification of olive yards.

Similar coverage rate and natural forms of scrubland, pasture and olive yards cause the mixing of all three plant types. Average accuracy and ground truth checks are normally result in similar rates. However this rates decreases for the mixed classes. The results show that the accuracy of fused images is higher for both training area defining method, which also proves the contribution of SAR to optical data for land use/cover mapping.

CONCLUSIONS

Sustainable land use planning is only possible by having natural sources inventory. Analyses of land use or land cover have been greatly facilitated in last decades by availability of remote sensing technologies. But we have still some difficulties of dealing with land cover determination in a high accuracy because of presenting various effects of topography, vegetation and climate. Land use or land cover can be mapped by optic or SAR images independently. Remote sensing-based land cover studies rely on premise that the radiometric response of objects on the earth's surface must differ in the spectral region covered by sensors. Optic and SAR techniques works very different from each other and they can recognize the different properties of land cover types. This research showed that combining optic and SAR images increases the accuracy of land use determination more than their independent uses.According to the statistics of evaluations, fused image by FUSE tools of PCI gives the better result. Overall accuracy is 91.14% and 8.58% improvement is gained in comparison to Landsat-5 classification results. According to the ground truth, accuracy is 81.20% with an increase of 6 % compared to the Landsat. Although existing polygon used classification method is planned as a proper comparison method, results depict that classification of fused Radarsat-1 Landsat-5 images by user defined training set has the highest overall accuracy. This means that image concatenation improved the accuracy of land cover map with the Radarsat-1 Fine Beam Images providing high resolution (6.25m x 6.25m high intensity) gathered in microwave part of spectrum.

It has been proven that SAR backscatter contributes to the intensity of the fused image, which helps visual interpretation of the images and having accurate classification results. Results from the study presented here also indicate that RADARSAT-1 images, fused with optical satellite imagery, can provide accurate information about land use (crop) types. It is important to gather optical and SAR data at the same time period for defining crop type correctly.

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SOIL CLASSIFICATION STUDY USING GEOMORPHOLOGIC BASED METHOD CASE STUDY: ZIDASHT REGION, IRAN

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Many researchers have studied on soil characteristics and zonation a region according to the type of its soils and several methods have been developed for it. Some of the methods that are using in Iran are geomorphologic based method, geologic based method, landform method, land suitability method, etc.

Using of each method need to recognition of geographic, climatic, and environmental condition of region, and scale, budget and goals of the plan.
In natural resources, it seems that the geomorphologic based method is scientifically suitable and reliable. This research was carried out using tow methods: Geologic based method and Geomorphologic based method. For this purpose, six sub watersheds have chosen in Zidasht region in Taleghan watershed, and then aerial photographs interpretation, different maps preparing, and field sampling were done. Required maps including geomorphologic map, geologic map, slope map, aspect map, etc; were provided using GIS. Then in the regarding to each method procedure, soil profiles were made and their soil samples were carried to soil lab for physical and chemical analysis.

The results show that soil classification using the geomorphologic based method is more reliable than geologic based method because of considering to spatial variation of soil characteristics.

Key words: *geomorphologic based method, geologic based method, soil, classification*

Introduction

Soil erosion is a hazard traditionally assosiated with agricuture in tropical and semi-arid area and important for its long-term effects on the soil productivity and sustainable agriculture. It is however, a problem of far wider significance occurring additionally on land devoted to forestry, rangeland, transport and recreation (Morgan, 1996). Scince the erodibility of soils determine its resistance to the detachment and transport, in soil erosion and sedimanation studies, identification the soil charactristics is very important. In fact final programs that are suggested for better management with a perspective on sustainable development would be done over the soil. programs that neglegt the soil and its charactristics in a region handling might be failed in future (Refahi, 1997).

There are several methods for studing the soil and providing the soil classification map. In this Research two methods that are used in Iran have been considered: Geologic based method and Geomorphologic based method.

Geologic based method: some geologists believe that bedrock is the most important agent that affects the soil charactristics and determines its erodibility. Theoretically, in this method it is assumed that each soil type has been developed on a specific gelogic formation. Thus the geologic map is the basis for studing the soils and providing the soil classification map. In this method the geologic map is prepared at first, then regarding to the location of each geologic formation and the region conditions some points are marked for sampling. Next step will be done in the field by sampling the soil from profiles and carring them to the lab for analysis. After determining the phisycal and chemichal characteristics of the soil samples soil classification map will be prepared.

Geomorphologic based method: In this method, it is assummed that soil properties depends on more agents than geology of the region such as climate, vegetation cover, topographic condition, etc. Thus soil classification map is provided regarding to these factors. In this method using base data of geology, erosion features, topographic condition, vegetation, etc, a homogeneous unit map is prepared. Then sampling from soil profiles is carried out within these homogeneous areas. After determining the soil samples properties during the lab analysis soil classification map will be prepared (Ahmadi, 1998).

Materials & Methods

Study area

The study area is the Zidasht region, in Taleghan watershed in the south-central Alborz Mountains, Iran. This region covers approximately 12600 ha and lies between 36 11$^{'}$ 07$^{''}$ to 36 50$^{'}$ 51$^{''}$ N and 50 39$^{'}$ 04$^{''}$ to 50 51$^{'}$ 10$^{''}$ E, as shown in figure 1. The area is mostly mountainous with steep slopes and valleys occurring at an altitude ranging from 1810 to 3280 m above mean sea level. A contour Digital Elevation Model (DEM) has generated from the 20-m interval contour map of the study area. The contour DEM has used to generate the slope, aspect, and altitude map. The erosion features and land use maps have provided by interpretation of aerial photographs of 1:20000 scales. The major land use categories of the study area are degraded dry land (62.42%) and poor range land (21.94%). The main geologic formations of the study area are volcanic, alluvial, and Quaternary deposits and erosion features are mainly sheet erosion, channel erosion, and old mass movement. The natural vegetation includes *Astragalus spp*, *Artemisia ssp*, shrubs, forbs, and annual and perennial grasses. The climate of Zidasht region could be considered as a cold semi humid and the average rainfall is about 465mm per year and the average temperature is 6.75°C. water deficiency is expected from July to October and a water surplus from January to May. Six sub-watersheds have separated in the study area (figure 1). Some physiographic characteristics of study area have shown in Table 1.

Soil sampling units

After preparing earlier maps of the region, based on each method, location of soil profiles were determined. Regarding to geologic based method, soil samples were taken from each geological unit at the points that were selected before. Soil Profiles were located at the indicator points on geological formations.

With regard to geomorphologic based method, it is necessary that we provide a map with integrated areal units that named homogeneous unit map. This map was provided by overlaying of geologic map, erosion features map, and slope map of the region as the most important factors in soil characteristics (figure 2). In homogeneous unit map, each unit has the uniform geology, erosion feature, and slope. Sampling from soil profiles were carried out within each homogeneous unit (Ahmadi, 1998).

Soil samples analysis

Soil samples were taken from 21 profiles in the areas that marked at previous stage with tow methods. Profiles were dug with enough depth (generally until bedrock), and samples were taken from each soil horizon to analyze in the lab. Some of the soils characteristics such as depth, structure, root condition, horizons boundary, etc, were determined in the field. In order to determine other physical and chemical properties such as soil texture, amount of organic mater, Ec, pH and CaCO3 content of soil, samples were carried to the lab for analysis. Table 2 shows the results of the lab analysis of soil samples.

Results & Discussions

There are 14 geologic units in Zidasht region. With regard to geologic based method in each geologic unit, one profile was taken at indicator point; then units with similar soil types were integrated to a soil class and soil classification map was provided (figure 3). Regarding to geomorphologic based method 21 homogenous units were distinguished in the region and soil samples were taken within each unit. After analyzing soils, units with similar soil characteristics were combined to a soil class. Finally, soil classification map was derived from homogenous unit map (figure 4).

In the geologic based method, only one criterion i.e. geologic properties of the region is used to provide soil classification map. Since the soil characteristics depend on more than one factor, it is possible that only geology could not represent the differences among soils completely. For example in Quaternary unit (Q1), three different soil types were distinguished.

The results of the two approaches using geologic based method and geomorphologic based method are summarized in Table 3.

It can be seen from the table that the maximum area of soil classes for geologic based method is about 25% for Lithic zerochrept, and for geomorphologic based method is about 23% for Lithic zerorthent. These areas in tow methods are mostly barren land without vegetative cover, poor rangelands, and ridges.

The GIS functions of the ILWIS-3.2 and IDRISI-2 software were used to determine the differences between two maps. The result shows the areas in which the classes have not changed and the areas in which the classes have changed from one to another. The areas that have no change are about 46%, and the areas with change in soil classes i.e. migrations (1-2, 1-3, . . ., 2-1, 2-3, etc.) between different classes are about 54%.

Table 1. Physiographic characteristics of sub watersheds

Unit N.	Name	Area (km^2)	Primeter (km)	Av. Slope (%)	Mean ele. (m)	Max. ele. (m)	Min. ele. (m)	Length of main channel (km)
1	Zidasht	7.243	26.4	14.5	2055.7	2400	1870	3.5
2	Fashandak	27.89	13.2	26.2	2301.4	2800	1870	11.6
3	Barikan	20.57	19.4	26.2	2160.5	2943	1870	7.5
4	Minavand	14.9	15.8	18.3	2200.6	2600	1810	5.2
5	Jazan	28.47	23.4	31.3	2452.09	3083	1870	10.2
6	Veshteh	18.06	22.2	29.2	2505.7	3281	1880	10

Table 1. Summarized results of the soil samples analysis

Prof. N.	topogrephy			Parent matterial	Thick-Ness(cm)	pH	CaCO3 (%)	O.M. (%)	EC (ds/m)
	Elv.	Slope	Asp.						
1	2250	90	SE	PAVE MENT	12	7.5	8.45	3.13	0.32
2	1970	10	W	PAVE MENT	50	7.5	15.61	2.25	0.31
3	2740	47	S	PAVE MENT	60	7.4	12.54	2.6	0.28
4	2020	40	SW	ROCK	45	7.5	21.38	2.21	0.25
5	1800	20	E	PARA LITHIC	45	7.6	40.63	1.63	0.26
6	1780	40	E	Lime	12	7.5	8.99	1.21	0.25
7	2650	45	N	ROCK	62	7.3	12.59	3.56	0.85
8	2350	15	NE	ROCK	31	7.4	16.58	1.64	0.53
9	2320	40	NE	Lime	60	7.4	5.81	1.58	0.45
10	2370	45	E	Lime	90	7.1	1.52	2.45	0.47
11	2250	25	S	PARA LITHIC	40	7.5	1.75	1.75	0.45
12	2960	75	SW	PAVE MENT	90	6.8	0.15	1.62	0.35
13	1920	5	W	PAVE MENT	100	7.5	5.9	2.61	0.57
14	2280	50	SW	PARA LITHIC	110	7.4	6.08	1.81	1.52
15	1500	5	E	PAVE MENT	35	7.4	7.4	1.61	0.45
16	2040	65	W	PAVE MENT	35	6.5	1.6	1.45	0.25
17	2080	55	W	PARA LITHIC	50	7.5	36.25	1.42	0.31
18	2100	50	SW	PAVE MENT	40	7.4	20.51	1.3	0.49
19	2450	50	E	PAVE MENT	30	6.8	0	0.95	0.26
20	1920	40	SW	PARA LITHIC	25	7.5	25.3	0.81	0.24
21	2050	90	SW	PAVE MENT	65	7.6	11.5	0.72	0.27

Table 3 Results of using geologic based method and geomorphologic based method

Soil Calss	geologic based method		Geomorphologic based method	
	Percent	Area(ha)	Percent	Area(ha)
Thypic xerochrept	20.56	2592.16	12.32	1551.70
Lithic xerorthent	20.03	2526.01	23.63	2978.38
Lithic xerochrept	25.22	3180.53	16.52	2082.91
Thypic xerorthent	13.83	1743.50	22.88	2884.05
Thypic calcixerept	7.22	910.59	0	0.00
Thypic xerofluent	0	0.00	1.46	184.15
Thypic calcixerollic	5.38	678.55	8.65	1090.78
Thypic xerorthent fine	7.76	978.54	14.54	1832.69
Total	100	12604.87	100	12604.65

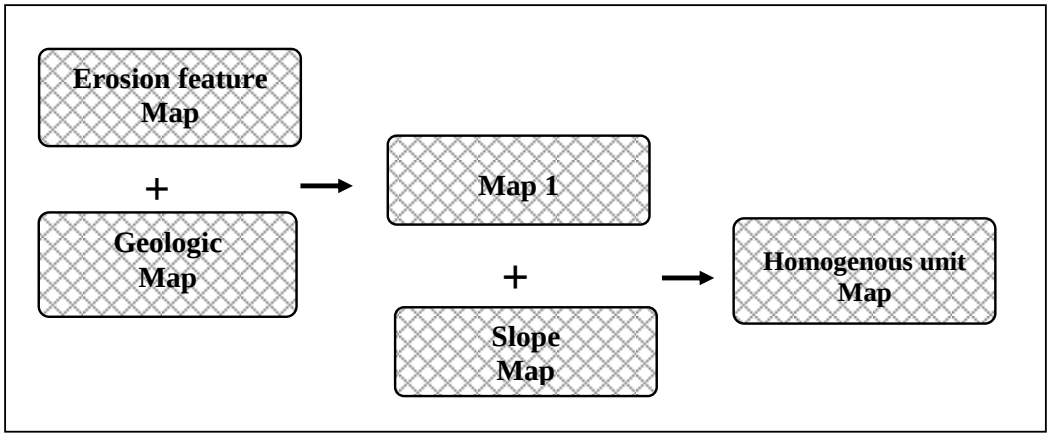


Figure 2. Schematic process of preparing of Homogenous unit map

Figure 1. Location of Zidasht region in Talegjan watershed

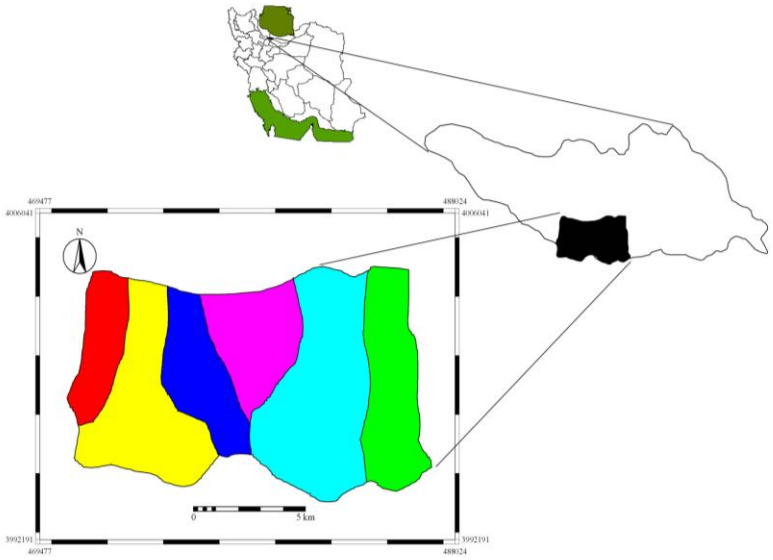


Figure 3. Soil classification map using geologic based method

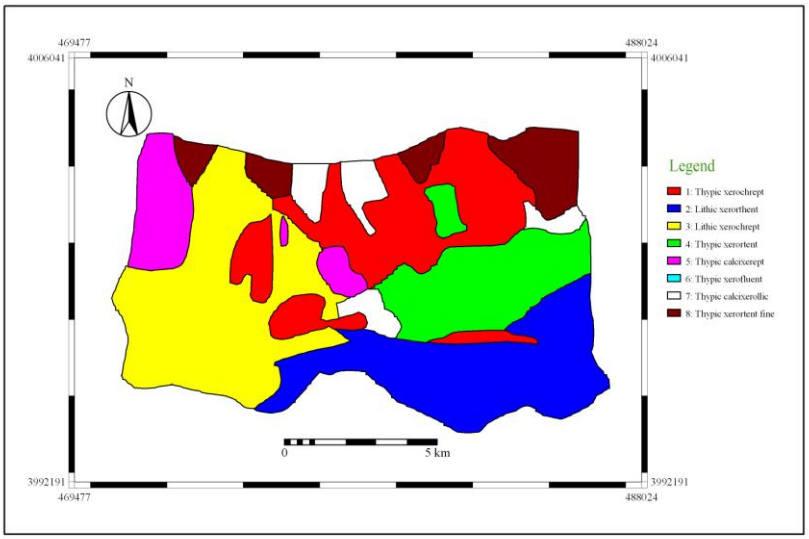
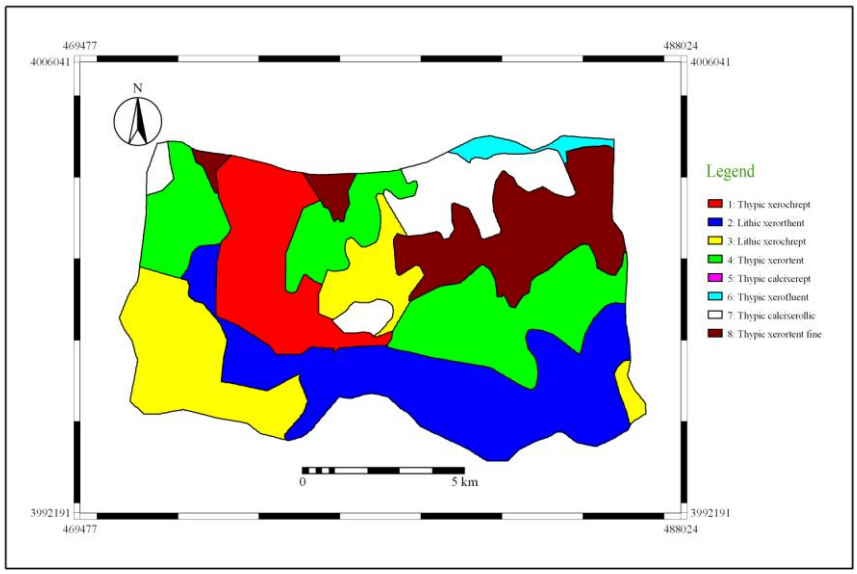


Figure 4. Soil classification map using geomorphologic based method



A comparison of the results from the Geologic based method and Geomorphologic based method (Table 3), shows that in Geologic based method boundaries of soil classes are nearly similar to geologic formation boundaries, thereby spatial variation within a specific geologic unit may not be shown. Nevertheless, in geomorphologic based method classification is carried out using three effective factors on changing soil properties that may represent the spatial variation more reliable.

Conclusions

The Geomorphologic based method is suited for soil classification because of consideration of different factors. Using of GI system allows spatial variation of relevant terrain and other parameters to be considered. Although the total areas of soil classes in two methods are nearly the same, there is substantial spatial variation within the soil classes.
It should be noted that for Geomorphologic based method, selection of considering factors to provide homogenous unit map need further studies to be consisted with the effective factors on soil properties.

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A NATIONAL MONITORING SYSTEM FOR RANGE ASSESSMENT IN IRAN

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Investigation on vegetation cover changes, range condition and range condition trend and information from influence rate of climate and management on range condition trend is important for management planning to obtain sustainable range utilization. Therefore for providing an updated database from rangelands in a national level and possibility of long term grazing capacity estimation in each climatic zone, advising people and government agencies about changes trend in rangelands and of course discussion with range scientists about obtained results and methods of vegetation parameters measurements, this research project was carried out. Main vegetation communities of each province were considered. In the key area of each community one site was established. In each site factors including vegetation cover, soil surface cover, density, and production along four 400 or six 200 meter transects within 60 two or one square meter quadrats in arid and semi arid areas were measured. Primary results showed that in arid regions of three provinces of Markazi, Isfahan, and Yazd, range ecosystems are in fragile conditions. Rangelands in these provinces generally were characterized with low vegetation cover, small production and poor range condition. Desirable species (class I) were absent in vegetation composition. Moderate and low desirable species (classes II and III) formed most parts of animal feed. Biological balance has been lost because of sever grazing. To do national analysis on data collected in different years and various regions necessity of creating a national monitoring system (NMS) was suggested.

Key words: *National Monitoring System, vegetation cover, range condition, site, satellite data.*

Introduction:

Plant composition, canopy cover, yield, Range condition, range condition trend, and grazing capacity permanently change due to climatic variation and management activities. The role of rangeland ecosystems in economy, soil and water conservation and other services giving to society is important. Planning utilization of rangeland in correct way needs correct, accurate and permanent information from rangelands. Such information will be obtained from monitoring in the long term. This information is important for government agencies, range holders and application of new technologies (eg. RS and GIS) Arzani et al. 2006.

Changes in quantitative parameters including abundance, vegetation composition, canopy cover and yield are influenced by abiotic and biotic factors. So distinguishing and separating role of factors causing changes are important for better management Anderson and Holte (1981).

Buffington and Herbel (1965) reported that drought has been main factor affecting vegetation cover changes in South west of United State during 1858 to1963. Hensi et al. (1983) and Arzani (1994) reported the same condition for Semi desert of New Mexico and Western Division of New South Wales in Australia.

York et al. (1992) found that reducing grazing pressure was most important factors for recovery of vegetation cover in south west shrub lands of Utah.
Curry and Payne (1992) believed that in Western Australia for better management of rangeland collecting information about production potential and problems of range management is essential. For permanent monitoring they established monitoring sites in main vegetation types to be able showing long term changes and to recognize cause of vegetation and soil degradation. Based on such comments monitoring system of Western Australia has been formed (Haker et al. 1992). They measure important factors each year in network of sites. It would help to show and separate effects of climatically factors and management on rangelands.
O, Connor and Roux (1995) reported that changes in shrub lands of Caro in South Africa during 1949- 1971 has been because of rainfall variation and animal grazing. Sevier grazing has been recognized as the most important reason for reduction of vegetation density in Kabotarkhan area during last 40 years by Rostami (1995). Mohammadi Golrang (1994) also believed vegetation composition in Amir Kabir watershed of Karaj dam from 1973- 1993 has been changed because of sever grazing. Arzani et al. (1999) compared rangeland of inside and outside of an excluder in Posht Kouh of Yazd and concluded that changes in arid zone communities would be very gradual and designing a monitoring system for permanent assessment of vegetation and soil characteristics of rangelands is essential.
The objectives of this research were investigation on variation of vegetation parameters in a long term to determine trend and severity of changes in three provinces of Markazi, Esfahan and Yazd.

Material and Methods:
The research was conducted in three provinces:
1. Markazi with the area of 29400 square kilometer located between 33°23' to 35°34' north latitude and 48°58' to 51°4' east longitude. Average rainfall is 250 mm. Rangelands form 1940000 hectare equal 64% of province area including highlands 46.6%, lowlands 16.6% and midlands 36.8%. Vegetation map with scale of 1: 50000 was created and 11 main vegetation types were selected (Table 1). In each selected vegetation type one site with four 400 meters parallel transects was established. Four sites were located in Artemisia community, 3 sites in *Astragalus* community and four sites in other vegetation communities. Elevation ranged from 980 to 2200 meter. Soil characteristics differed between sites.

Table 1: Vegetation types selected in Markazi province.

City	Site	Latitude and Longitude	Elevation	The annual mean of rainfall	Vegetation Type
Saveh	Nemati	50°40′13" 35°27′23"	1325	213.02	***Artemisia sieberi- Salsola rigida***
	Anjilavand	50°34′52" 34°58′15"	981	144.34	*Artemisia sieberi- Noaea mucronata*
	Azablo	50°53′53" 35°25′28"	1125	267.64	*Artemisia sieberi - Stipa barbata*
	Akbar abad	50°16′29" 35°05′51"	1359	296.88	*Ptropyrum olivieri – Artemisia sieberi*
	Khoshkrod	50°15′13" 35°24′13"	1400	296.2	*Hulthemia persica - Noaea mucronata*
Khomein	Sian	50°02′22" 33°51′15"	1973	183.04	*Astragalus gossypinus - Scariola orientalis*
	Gol-zard	50°04′40" 33°33′48"	1955	323.44	*Astragalus gossypinus - Cousinia cylindrica*
	Farnagh	49°55′07" 33°32′02"	2135	199.4	*Astragalus prrawianus - phlomis persica*
	Aznojan	50°16′31" 33°41′47"	1710	173.2	*Noaea mucronata- Artemisia sieberi*
Arak	Shanagh	50°12′03" 34°03′30"	1975	231.84	*Artemisia sieberi- Stipa barbata*
	Chazan	49°08′44" 34°33′43"	1700	226.98	**Camphorosma monspeliacum-Halimione verrucifera**

2. Esfahan province:
Esfahan with the area of 105937 square kilometers located between 30° 43' to 34° 27' north latitude and 49° 36' to 34° 27' east longitude. Rangelands area is 6.3 million hectares including semi desert (49%), arid (37%) and semi arid (14%). Selected vegetation types were illustrated in table 2.

Table 2- Vegetation type in stepic regions Esfahan province

City	Site	Latitude and Longitude	Elevation	The annual mean of rainfall	Vegetation Type
Najaf	Alavije	51°09′30" 33°02′22"	1600	167	***Artemisia sieberi- Anabasis aphylla***
Golpayeg	Khoandab	50°34′52" 34°58′15"	1995	277	*Artemisia sieberi*
	Golpayegan	50°42′55" 33°14′67"	1735	270	*Scariola orientalis- Cousinia cylidrica*
Mymeh	Mote	50°22′16" 33°36′34"	1740	260	*Artemisia sieberi*
Natanz	Klahrod	51°33′17" 33°17′67"	1895	152	*Artemisia sieberi- Scariola orientalis*
Esfahan	Kamsheche	51°44′13" 33°03′15"	1550	108	*Noaea mucronata- Cousinia cylindrica*
	Shor abad	51°53′92" 32°55′	1885	114	*Convolvolus fruticosus- Astragalus spp.*
	Charmshahr	51°32′00" 33°01′00"	1495	111	*Artemisia sieberi- Noaea mucronata*
Shahr Reza	South of Shahr-Reza	51°55′15" 31°59′50"	1680	117	*Euphorbia spp– Scariola orientalis*
	East North of Shahr-Reza	51°46′33" 32°06′96"	1720	94	*Convolvolus fruticosus - Scariola orientalis*
	Gardane Shayan	52°02′30" 32°57′30"	1870	107	*Artemisia sieberi- Acantholimon sp.*

3. Yazd province:

Yazd province is located between 29° 48' to 33° 30' north latitude and 52° 45' to 56° 30' east longitude. Area of province is 72156 square kilometers. Winter is cold and relatively humid with hot and dry summer. Average annual rainfall is 106 (mm). Fifteen major vegetation communities were selected in Yazd province (Table 3).

Table 3- Vegetation type in stepic regions of Yazd province

City	site	Latitude and Longitude	Elevation	The annual mean of rainfall	Vegetation Type
Taft	Gariz-Sofla	54°07′ 31°17′	2050	-	*Artemisia sieberi- Salsola tomentosa*
	Mazrae-Amin	53°46′ 31°48′	2650	211	*Artemisia aucheri- Astragalus gossypinus*
Sadogh	Sadr-Abad(1)	53°40′ 31°53′	2400	145	*Artemisia sieberi -Zygophyllum eurypterum*
	Sadr-Abad(2)	53°36′ 31°54′	2220	140	*Artemisia sieberi-zygophyllum eurypterum*
	Sadr-Abad(3)	53°23′ 31°55′	2200	140	*Artemisia sieberi- Eurotia ceratoides*
Mybod	Eshniz	54°02′ 32°13′	1140	70	*Fortuynia bungei- Artemisia sieberi*
Ardakan	Mazre-Amin	54°37 33°19′	1850	123	*Artemisia sieberi- Petropyrum aucheri*
	Chah-Afzal	53°58′ 32°28′	1002	55	*Seidlitzia rosmarinus-Artemisia sieberi*
Yazd	Fahraj	54°32′ 31°45′	1280	60	*Hammada salicornia-Artemisia sieberi*
Mehriz	Ebrahim-Abad	54°20′ 31°36′	1500	116	*Cornulaca monocanta-Artemisia sieberi*
	Dasht - Kalmand	54°30′ 31°26′	1620	-	*Artemisia sieberi -Lactuca orientalis*
	Dehshir	54°16′ 31°22′	2080	140	*Artemisia sieberi -Aellenia subaphylla*
	Ali-Abad	54°16′ 31°15′	1950	126	*Ephedra strobilacea-Zygophyllum eurypterum*
Khatam	Marvast(1)	54°14′ 30°53′	1700	80	*Haloxylon persicum- Salsola arbuscula*
	Marvast(2)	54°14′ 30°41′	1550	70	*Caligonum polygonoides-Salsola tomentosa*

In each site cover and yield were measured within 60 two meter square quadrates along 4 transects. Measurements were repeated for 5 years. Yield was measured using a double sampling procedure suggested by arzani and King (1992). Based on this method both cover and yield measured in 15 exclosured quadrates. The equation between cover and yield of each species was calculated. Then yield for other 45 quadrates was estimated using cover data as independent variable. Minitab 13.3 was used for data analysis.
Plants were classified to 3 palatability classes of I (desirable), II (moderate desirable) and III (non desirable). Climatic data in each region was collected from nearest synoptic stations to sites.

Range condition:

To determine range condition for each year of measurement method called four factors suggested by parker (1952) was applied. One photo point was established in the beginning of transect 1 in each site. Information obtained from monitoring program was sent to range holders and government agencies for better management (pictures 1-4).

Pi

Mean of cover and yield from Markazi province has been presented in table 4. Rangelands of Arak city had higher canopy cover and yield (24% and 328 kg/ha). This has been occurred where *Halimioim verucifera* and *Comphorosma monspelicaum* were dominant on salty soil with high moisture content. In such community range production was less affected by rainfall variation. Saveh had lowest canopy cover and yield in this province (19% and 65.5 kg/ha). Most species were belonging to class III palatability in this area. *Artemisia sieberi*, *Noaea mucronata*, *Stipa barbata* and *Salsola rigida* made most part of yield in Markazi province.

Table4: the mean of canopy cover and production in 3 city of Markazi province.

city	year	Mean of cover (palatability classes)			Mean of production (palatability classes)			The mean of cover total	The mean of production total
		I	II	III	I	II	III		
Saveh	1998		9.79	9.79		64.68	6.54	19.58	71.22
	1999		9.38	9.47		48.05	11.09	18.85	59.14
	2000		6.35	8.52		39.05	3.81	14.87	42.86
	2001		9.15	9.5		65.78	9.02	18.65	74.8
	2002		9.67	12.42		79.83	9.22	22.09	89.05
Mean			8.63	10.01		57.81	7.76	18.64	65.58
Khomein	1998	0.05	8	8.48		108.28	6.57	16.53	114.84
	1999	0.06	5.08	10.65		53.75	5.46	15.79	59.22
	2000	0.03	11.38	8.79		60.16	6.77	20.21	66.94
	2001	0.03	10.2	15.46		60.48	10.48	25.7	70.96
	2002	0.04	11.78	16.63		109.3	14.03	28.45	123.34
Mean		0.04	9.35	12.51		75.3	8.5	21.91	83.8
Arak	1998		15.35	8.37		379.32	30.24	23.73	409.57
	1999		14.68	6.25		243.25	21.33	20.94	264.58
	2000		13.54	8.34		391.83	21.8	21.88	413.63
	2001		15.05	9.95		326.33	22.9	25	349.24
	2002		16.04	13.78		180.4	23.24	29.82	203.65
Mean			14.93	9.34		304.22	23.9	24.72	328.13

Average annual rainfall during five years of monitoring in this province has been illustrated by figure 1.

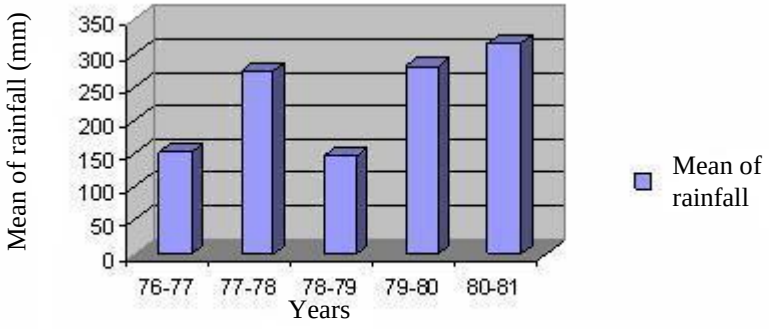

figure 1. The mean of rain in five years(Markazi province)

Range condition trend has been constant. Range condition in different sites varied between poor to fair condition with constant and positive trends.
Table five shows range production and cover of 6 regions of Esfahan province. Golpayegan with 11.5 percent canopy cover and 158 kg/ha yield had better condition and Najaf Abad with 5% canopy cover and 40 kg/ha showed lowest condition. Mostly class II palatability formed range production.

Table5: the mean of canopy cover and production of rangelands in 6 city of Esfahan province.

city	year	Mean of cover (palatability classes)			Mean of production (palatability classes)			The mean of cover total	The mean of production total
		I	II	III	I	II	III		
Esfahan	1998	0.02	0.59	3.47	0.22	34.18	12.52	4.08	46.93
	1999	0.04	1.73	2.67	0.52	43.66	22.57	4.45	66.75
	2000	0.05	1.67	2.64	0.63	39.53	13.48	4.38	53.65
	2001	0.07	1.79	4.42	1.23	42.13	34.43	6.29	77.79
	2002	0.07	1.46	4.57	0.75	36.85	31.77	6.11	69.31
Mean		0.05	1.45	3.55	0.67	39.27	22.94	5.06	62.89
Shahr Reza	1998	0.007	3.85	2.2		68.57	1.68	6.07	70.26
	1999	0.01	2.55	2.76		74.17	1.58	5.33	75.75
	2000	0	3.41	3.06		74.11	1.72	6.48	75.83
	2001	0.002	4.49	3.73		82.06	2.4	8.23	84.47
	2002	0	4.47	4.75		73.11	1.36	9.22	74.47
Mean		0.004	3.75	3.3		74.4	1.75	7.06	76.15
Golpayegan	1998	0.01	8.2	3.78		168.8	23.48	12.01	192.3
	1999	0.01	6.24	2.17		73.56	19.49	8.43	93
	2000	0	6.72	1.45		87.48	18.1	8.18	105.58
	2001	0.08	11.96	4.2		204.58	33.59	16.27	238.17
	2002	0	8.22	4.57		122.15	40.2	12.9	162.35
Mean		0.02	8.27	3.23		131.31	26.97	11.55	158.28

Average rainfall during 5 years has been illustrated by figure 2. Range condition trend in this province has been constant with mostly poor condition.

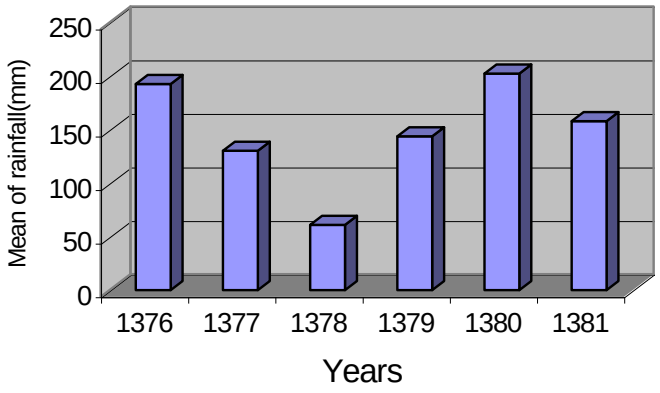

Figure 2. The mean of rain in five years (Esfahan province)

Average cover and yield of Yazd province has been presented in table 6. Sadough area with 22% of canopy cover and Taft with 227 kg/ha yield had highest cover and yield compare with Maybod area with 4% canopy cover and 38 kg/ha yield.

Table6: the mean of canopy cover and production in 7 city of Yazd provinces.

city	year	Mean of cover (palatability classes)			Mean of production (palatability classes)			The mean of cover total	The mean of production total
		I	II	III	I	II	III		
Mybod	1998		5.73			98		5.73	98
	1999		4.4			26.15		4.4	26.15
	2000		5.28			23.9		5.28	23.9
	2001		3.06	0.06		23.6		3.12	23.6
	2002		2.4			19.05		2.4	19.05
Mean			4.18	0.01		38.14		4.18	38.14
Yazd	1998		0.45	4			13.33	4.45	13.33
	1999		0.78	5.4		1.33	17	6.1	18.33
	2000		0.15	4.17		101.6	7	4.3	108.6
	2001		0.57	4.43		13.33	13	5	26.33
	2002		0.6	3.28			95	3.8	95
Mean			0.5	4.2		23.25	29.06	4.7	52.13
Taft	1998		5.62	9.54		150.7	89	15.16	239.7
	1999		8.54	15.08		26.65	41.93	23.62	67.42
	2000		5.75	11.74		18.66	101.3	17.49	119.92
	2001		5.72	10.66		180.75	198.5	16.37	379.25
	2002		6.35	11.26		149.41	180	17.62	329.41
Mean			6.39	11.65		105.23	122.13	18.05	227.14
Khatam	1998		1.72	6.18		61.67	17.5	7.88	78.17
	1999		2.35	4.61		43.4	5.15	6.96	48.55
	2000		1.21	5.07		34.42	0	6.24	34.42
	2001		2.13	5.84		101.3	116.65	7.96	217.98
	2002		2.04	4.52		74.42	13.3	6.59	76.05
Mean			1.89	5.24		63.05	30.52	7.12	91.03

Average annual rainfall has illustrated by figure 3. Sever drough was occurred in 1999 and good season was experienced in 2002.

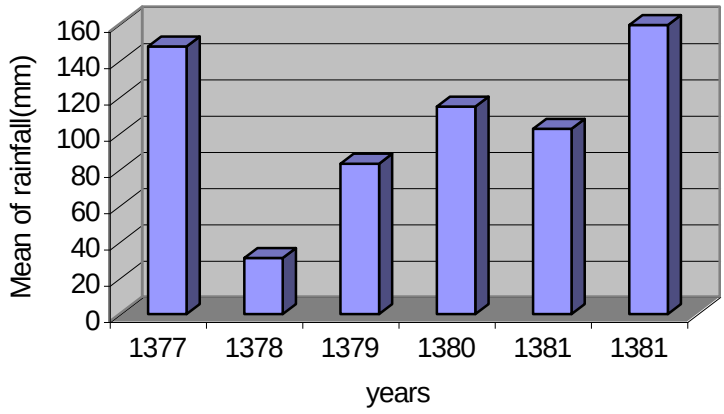

Figure 3. The mean of rain in five years (Yazd province)

Communication with people:
Result of each site with comments were sent to owners, information of sites located in each region Was sent to local government office and information of site located in each province was sent to central government office in each province.

Discussion:
According to the results, generally main reason for changes in vegetation cover and yield during five years of study in all provinces was precipitation variation. Boufington (1965), Hensi et al. (1983), Arzani and king (1994) and O, Connor and Roux (1995) also had similar finding in different arid areas. We found that changes in arid areas are gradual. It was also reported by Arzani et al. (1999) after 10 years enclosure in Poshtkouh of Yazd. So a monitoring system should be design to determine trend of quality and quantitative changes of cover and soil in arid zones.
Management activities also can affect on vegetation composition and vegetation cover. Rainfall variation during five years has been not regular so it is difficult to relate vegetation changes to rainfall variation. This is similar to finding of West et al. (1984), Anderson and Holt (1981) and Sneva et al. (1980) in sagebrush community in USA. West et al. in spite of desirable variation of rainfall during their five years study did not report significant changes for perennial grasses in five 13 years old enclosures. They believed that for improvement of range production by increasing grass density more time is required. Holt and Anderson (1981) reported slow change after 25 years excluding from grazing. However Sneva et al. reported an increase in grass production compare with sagebrush production after 30 years.
In this study considering species those grazed by animal based their production, type of management of animal and rangeland has affected on changes of some species.
Rangelands in studied areas characterized by low vegetation cover and yield, and poor range condition. Class I species were not presented in vegetation composition and classes of II and III formed vegetation cover. Desirable species have been degraded and ecosystems had fragile conditions.

A national monitoring system (NMS) is required for permanent measurement to distinguish reason for changes (climate or management). Such a monitoring system will provide sufficient information for decision making in national level, and planning for better management and adjusting utilization level of rangelands.

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AIRBORNE HYPERSPECTRAL IMAGING SYSTEM FOR MANAGEMENT AND CONSERVATION OF MOUNTAIN FOREST PARK IN KELANTAN, MALAYSIA[1]

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Recently, the mountain forest biodiversity in the state of Kelantan, Malaysia has attracted increasing attention as a means of state economic development. It has a land area of 1.5 mil. ha and 60% is still under a dense moist forest cover. However, the state government lacks real-time geospatial information to develop an effective conservation plan into specific categorized management zones. An airborne hyperspectral imaging survey prompted the State to gazette the entire Gunong Stong F.R as one of its prime production forests into the best managed state forest park. This paper demonstrates the operationalization of airborne hyperspectral imaging technique for a rapid appraisal of the bio-physical resources in developing management and conservation strategies of a proposed State Forest Park. It provides criteria indicators to identify potential forest management and conservation with the "ready-make" GIS inputted airborne data. Results indicated that airborne hyperspectral sensing can easily identify individual big-sized commercial timber species and estimate their timber volume, biodiversity, locate and map recreational, cultural/historical sites, suitable for potential strate forest park management and conservation strategy plan. This study implies that airborne hyperspectral sensing/GIS is a useful tool for future quantitative mountain forest landscapes assessments towards implementing conservation programs appropriate for a best conserved and managed mountain forest state park in Malaysia.

1. INTRODUCTION

The management and conservation of mountain forest resources require that the policy makers and managers have access to a broad base of physiographic, geomorphic and ecological geospatial information. Access to this type of data has become increrasingly available in developed countries, often on-line and at minimal or even no cost. However, for a country like Malaysia, reliable information on the physical attributes, extent and type of forest species and forest landuse/cover patterns is lacking. A well managed and conserved mountain forest resource provide opportunities for future expansion of ecologically-based industries, such as the forest eco-tourism industry. Good conservation principles and management decisions should be made based on high standards of geospatial information, wisdom and community involvement in decision making (Kamaruzaman and Dahlan, 2006a).These forests such as that of Gunung Stong in Kelantan are however complex and difficult to map due to the combination of biodiversity and factors which inhibit data collection, such as cloud cover. To help the Kelantan state government make critical management and conservation decisions on the recently gazetted entire G. Stong F.R, they need real-time digital geo-spatial data in the forms of maps in an integrated system where it can be easily and quickly gathered, organized,

and analyzed to find patterns and relationships that were previously unrecognized (Kamaruzaman and Dahlan, 2006b). The airborne hyperspectral sensing fills this gap by providing spatial analysis tools to support decision making. The objective of this paper is therefore to develop conservation and management principles for G. Stong mountain forests using airborne hyperspectral sensing as a tool. A conservation and management vision with a Master Plan was outlined which established broad principles for management and conservation planning of G. Stong as a State Forest Park. The primary aim of this Plan is to ensure that G. Stong State Park is conserved and managed in an environmentally sensitive, sustainable and economically viable manner, responsive to changing local people expectations and expanding knowledge of the forest ecosystem.

2. METHODS AND MATERIALS

The study area is located in G. Stong, Kelantan which is about seven hours drive by car from the capital city Kuala Lumpur (Figure 1). The state of Kelantan covers an area of 1.5 mil. ha of which about 894,271 ha or 60% is under forest cover. It is still very much endowed with a rich and diverse biodiversity, such as in the dipterocarp forests of the reserves, in the National Park, limestone hills of Gua Musang, montane forests of the Main Range, Virgin Jungle Reserves etc. It is fortunate in that it has vast areas of lowlands, high rolling mountains and hills, which therefore possess many species of plants and animals associated with those ecosystems. The G. Stong Forest Park, which occupies the whole of G.Stong Tengah F.R of 21,950 ha in the mid-western region of Kelantan, is under the administration of the West Kelantan District Forest Office. The Stong Forest Park covers three different forms of forest ecosystem ranging from the hill dipterocarp forest to the upper hill dipterocarp forest and the montane forest.

Fig. 1. A map of Peninsular Malaysia showing the location of the study site

An airborne hyperspectral imaging data capture was conducted in April 2006 using a UPM-APSB AISA's spectrometer available in the Forest Geospatial Information & Survey Lab, Lebuh Silikon, Universiti Putra Malaysia mounted on a fixed-wing GAF Nomad 22B aircraft (Figure 2). The UPM-APSB's technology is based around an airborne digital pushbroom scanner operating in the visible/near-infrared range which uses on-board real time differential GPS for positioning and Precision INS for measuring and recording aircraft pitch, roll and yaw (Figure 3). This gives AeroMAP^{TM} the ability to produce accurate base maps for State Park management and conservation planning in G. Stong. The airborne data was first pre-processed on-board the aircraft using a Caligeo software and later subjected to advance processing anlaysis using an ENVI Version 4.0 which led to the production of AeroMAP^{TM} geospatial base map data products utilized for management and conservation decisions to best managed and conserved the State Forest Park. The methodology flowchart is illustrated in Figure 4.

Fig. 2. Mounting the UPM-APSB sensor on-board the GAF N22B aircraft

Fig. 3. The complete airborne system with a total weight of only 15 kg

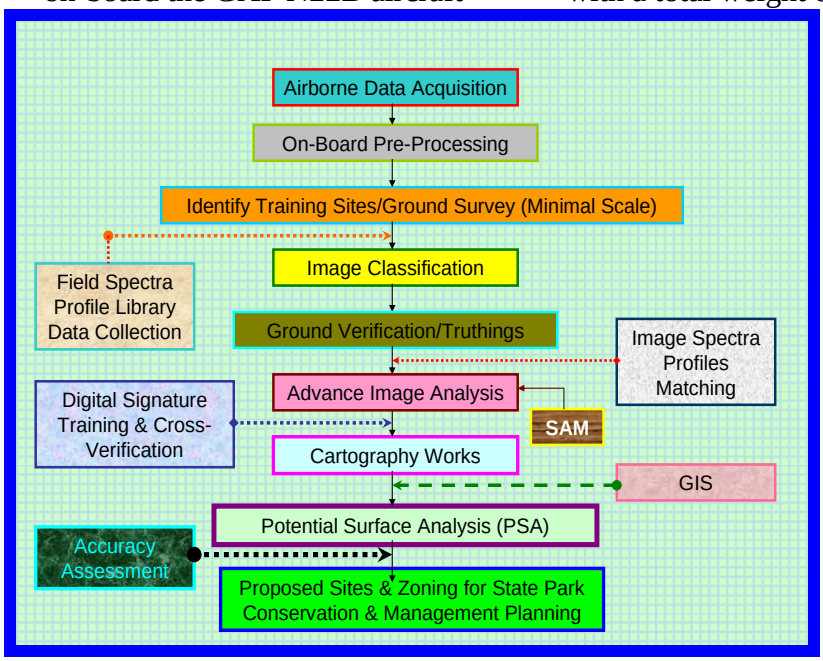

Fig. 4. A methodology for mapping and classification of sites for potential conservation and management planning in a state forest park

3. RESULTS AND DISCUSSION

Based from the advanced processed digital airborne hyperspectral data and the unique spectral signatures developed from UPM-APSB's airborne hyperspectral imaging "ready-made" GIS data, G. Stong State Park has rich natural assets, for instance, a "big size" commercial dipterocarp timber tree (Meranti bukit-*Shorea platyclados*) with diameter breast height (dbh) of 200 cm and 26 m in merchantable height, geospatially located at latitude 05^0 20' 19.7" and longitude 101^0 57' 03.8" (Figure 5). It was estimated that there are more than 100 other big sized commercial timber tree species especially that of Meranti seraya (*Shorea curtisii*) and Meranti tembaga (*S. leprosula*) with a diameter of above 100 cm at breast height which can be individually counted from the processed airborne AeroMAP^{TM} base products. For the purpose of biodiversity conservation and management, these trees are individually marked on a tree location map and tagged on the ground for eco-tourist observation on old-matured dipterocarps of Malaysia's mountain state forest park.

G. Stong also features one of the highest Jelawang Falls waterfalls (Figure 6) in Southeast Asia. From a height of 630 m (1,500 feet) it falls onto a 7-tiered cascade.

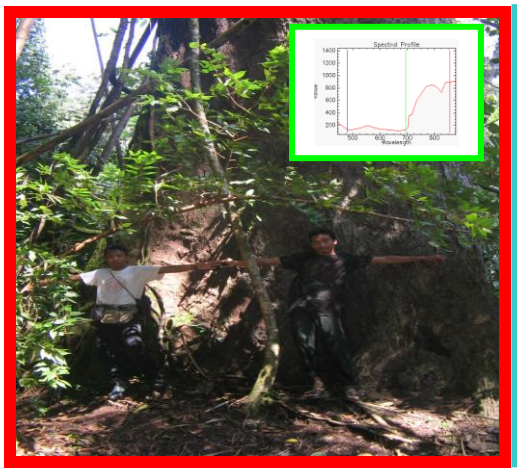

Fig.5. A Meranti bukit buttress with a dbh of 200 cm and tree height of 26 m discovered from the UPM-APSB sensor

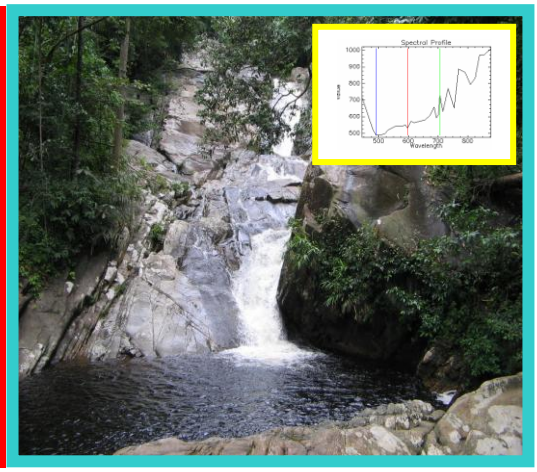

Fig. 6 . Part of the Jelawang waterfalls mapped in G. Stong State Forest Park using airborne hyperspectral imaging

There are also several potential ecotourism and cultural sites such as the mountain peaks (Figure 7), caves (Figure 8) and ex-logging tracks (Figure 9) discovered from the UPM-APSB imaging sensor with the help of ground truthings. Other places of interests include the crystal clear water trapped in the "Seven Magnificient" wells (Figure 10) which certainly attract eco-tourists to such a cultural spot in G. Stong State Forest Park. The rich natural assets of Stong Forest Park however need to be managed and conserved based on a world class system of management (Abdullah et al., 2006). In this respect, a long term Master Plan over a hundred years may need to be drawn up. This Master Plan should be reviewed every five years, with public participation to evaluate the progress towards the stated principles and aims, and to consider new issues and circumstances.

Fig. 7. The peak of G. Stong suitable for mountain climbers' panoramic viewing

Fig. 8. Caves such as Gua Bogo can be easily located from the airborne sensor

Fig. 9. Existing ex-logging tracks identified suitable for walking trails

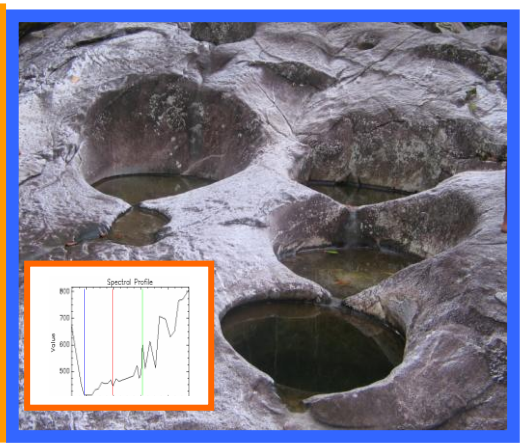

Fig. 10. The "seven magnificient" wells mapped with the UPM-APSB sensor

It is therefore critical that the management should aim to ensure that these indigenous species and vegetation communities will survive and flourish across their natural range. In addition, the use of State Park forest resources should follow principles of sustainable management (Kamaruzaman and Dahlan, 2006c). Standards should be maintained and improved by implementation and review of codes of practice, management guidelines, prescriptions, licensing and regulation of commercial activities on state land. The sustainable management and conservation use of the State Park forest for recreation and tourism will be encouraged and facilitated so as to contribute to the state economic development and employment opportunities of the Kelantanese.

Several guiding principles need to be developed in order to ensure that G. Stong State Forest Park is well conserved and managed (Dahlan and Abdullah Sani, 2006). Above all, it should be permanently protected under the Malaysian National Forestry Act 1984. As such it's natural integrity will be conserved under sustainable forest management, with its natural values protected and presented. It needs to be managed in the context of surrounding landscapes with participation and involvement of local community needs and aspirations.

Opportunities will be provided for people to visit, participate in, learn about, respect, enjoy, preserve and while maintaining the intrinsic values and protect the Stong Forest Park's natural heritage.Visitors will be provided with safe facilities and with information that will promote visitors awareness of the hazards present and the levels of skill and competence required to cope with the risks they may face. A dedicated, skilled and motivated workforce will manage the Park, using clear policies, directions and standards.

4. CONCLUSION AND RECOMMENDATIONS

The UPM-APSB's AISA airborne hyperspectral imaging system has a great potential to be operationalized for G. Stong's survival and sustainability if properly managed and conserved. Despite, being in an infancy stage, it is the cornerstone to conserve nature at the state level and probably in the future, be integrated as part of the Malaysian national park's system. The Park should ensure conservation of natural values for all time and for all peoples. Continuing engagement between people and parks, including enhance opportunities for all to visit, participate in, learn, respect, enjoy and preserve the Park as a fundamental purpose of biodiversity's management and conservation to ensure that the only use of the Park is nature-based and ecologically sustainable. The Stong forest Park is expected to be conserved, planned and managed skillfully, effectively, adaptively and efficiently to maintain park values.

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STUDY OF ENVIRONMENTAL DEGRADATION AROUND THE JAJRUD RIVER USING GEOGRAPHICAL INFORMATION SYSTEM AND REMOTE SENSING

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Varamin plain is one of the great agricultural plains in Tehran province, and Jajrud River is the main of water surface sources in this plain. Most of the lands around the river and in the southern of plain are degrade because of salinity and water logging. In this research for surveying the land degradation, TM imagery and also GIS tools was used. False Color Composites and visual interpretation have shown that most of the water logging and salinity problems are on the southern of plain that river were exited. The buffering analysis along the river was performed to indicate the hydro-salinity impact on degradation of lands and its vegetation vigor. Also with help of peizometers data in the study area through GIS analysis the extent of waterlogged soils was estimated. The results show the extent of water logging lands and also impact of rivers hydro-salin around of its lands.

Keywords: *Soil Degradation, Geographical information system, Remote Sensing, Jajrood River*

Introduction

Land degradation due to water logging and subsequent salinization has been so enlarged that it is now being regarded as a global environmental problem, desertification. It is, therefore, important to monitor land and water management scenarios causing severe land degradation and low productivity. Remote sensing is one of the key tools in monitoring local, regional and global environmental issues. More recently, much attention has been paid to spatial analysis due to merging of geographic information system (GIS) and satellite images for environmental research and applications. (1,4)

The present paper describes an attempt, where in Thematic Mapper (TM) digital data have been used along with other maps and field data, to monitor land degradation due to hydro-salinity .

Characteristic of area

Jajrud river is a perennial river which rises in the Elburz Mountains northwest of Tehran. This river, which is the only major surface water resources available, rises in the Elburz Range, north of Tehran. Its watershed is 1892 km², of which at present only 692 km² are controlled bye the Latyan Dam. This Dam is located near the village of Latyan, some 38 km upstream from where the river enters the plain (figure1). Approximately 22 km downstream of the dam an important tributary, the damavand Rud, joins the main river. (2,5)

And then river entrance to the Varamin plain that is one of the great agricultural plains in Tehran province, and this river is the main of water surface sources in this plain. (5)

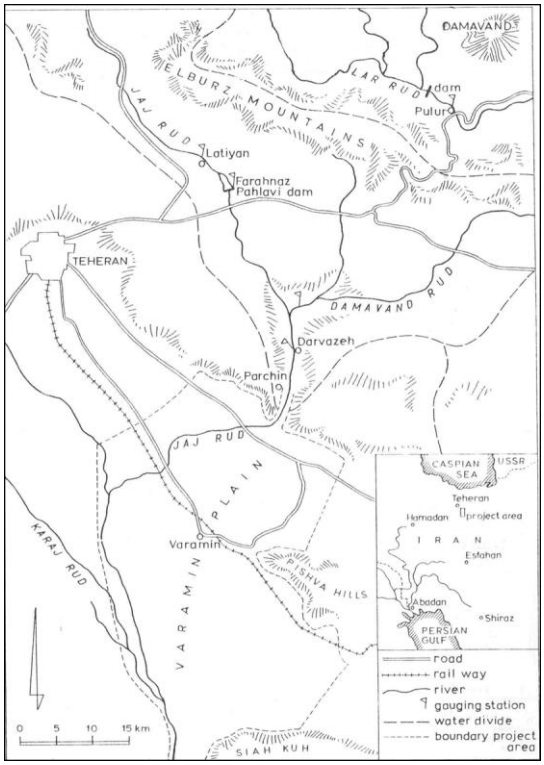

Figure 1.Location of the Varamin plain and Jajrud watershed

Material and methods

In this research were used from Landsat TM data on dated of 1998, topographic maps of scale 1:50000 and 1:250000, soil maps and climate data and water table data from 112 piezometer wells that are distribute in varamin plain were used and also the others data which obtained from field practices.
Arc view 3.1 , and also Ilwis 3 Beta software were used for assessment soil degradation and analysis of remote sensing and geographic information system.

At first TM images were georefrenced with help of topography maps.
The map of Jajrud river were digitized in the GIS environment with help of satellite images and also topography maps. (Figure 2)

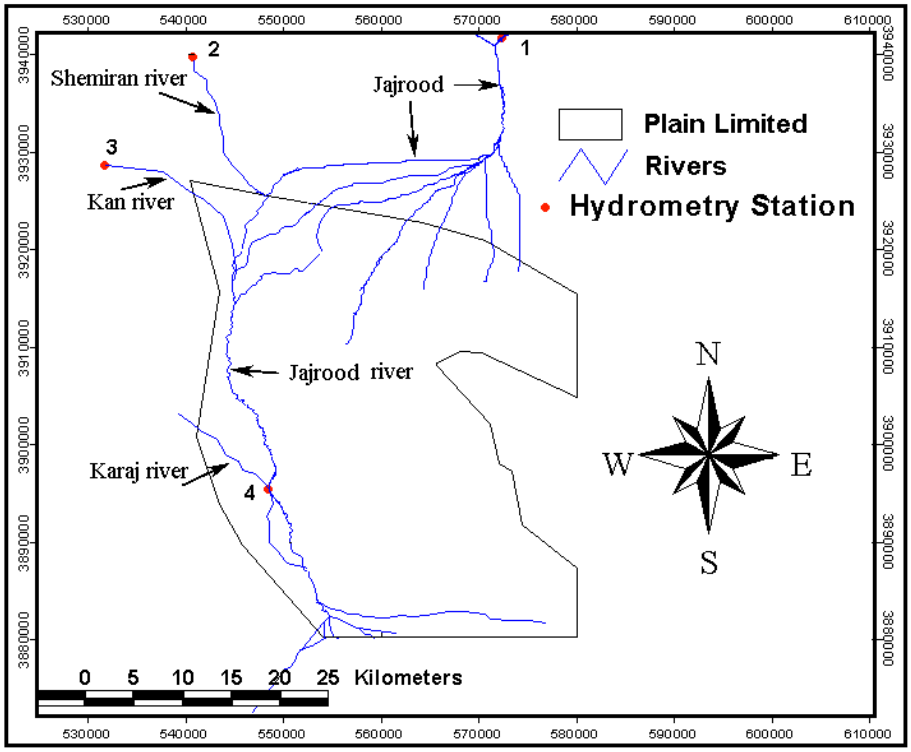

Figure 2.Jajrud river and the branch river in Varamin plain

For monitoring water logging, at first used from image enhancement, various stretch and color composites were generated and visual interpretation was done and the water logging areas was distinguished in the region. (Figure 3).

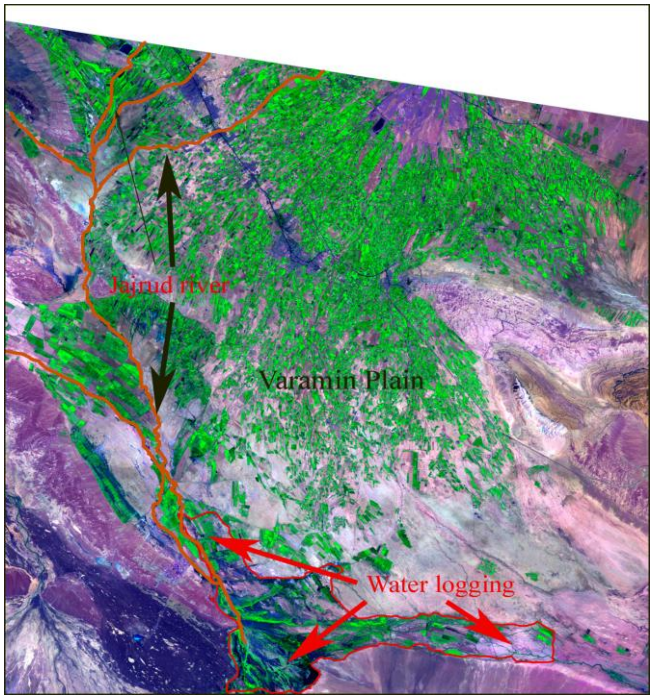

Figure 3.False color composite 741 & visual interpretation

With use of ground water level data from piezometer wells, the water level map of plain was distinguished (figure 4), and also critical groundwater depth with help of Kovda equation was obtained (3). Kovda equation is:

$Y=170+8(T) \pm 15$

Where:

Y is deep of critical water level
T is average of yearly temperature.
Temperature in Varamin plain is 16.2 `c
And therefore According to above equation, deep of critical water level was obtained:
Y max =314.6 cm = 3.15 m
Y min =284.6 cm =2.85 m

And then water table map classified with attention to this subject. (Figure 5)

Buffering analysis along jajrud and the other branch rivers was performed for to see the hydro-salinity impact on soil degradation and its vegetation vigor.(Figure 6)

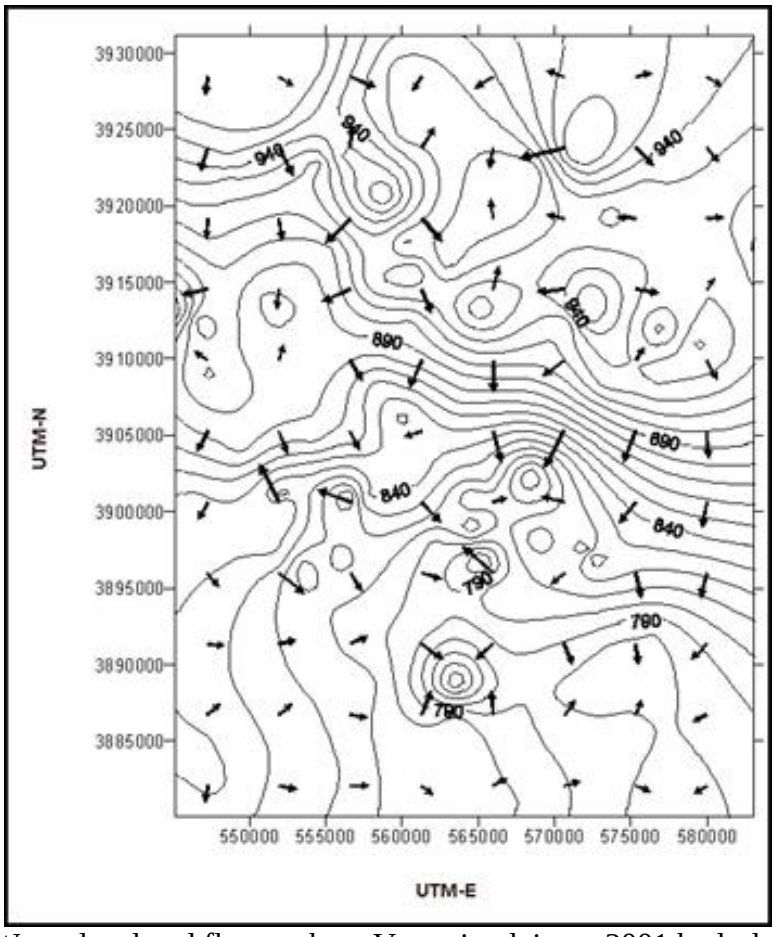

Figure 4.Water-level and flow path on Varamin plain on 2001 hydrologic years

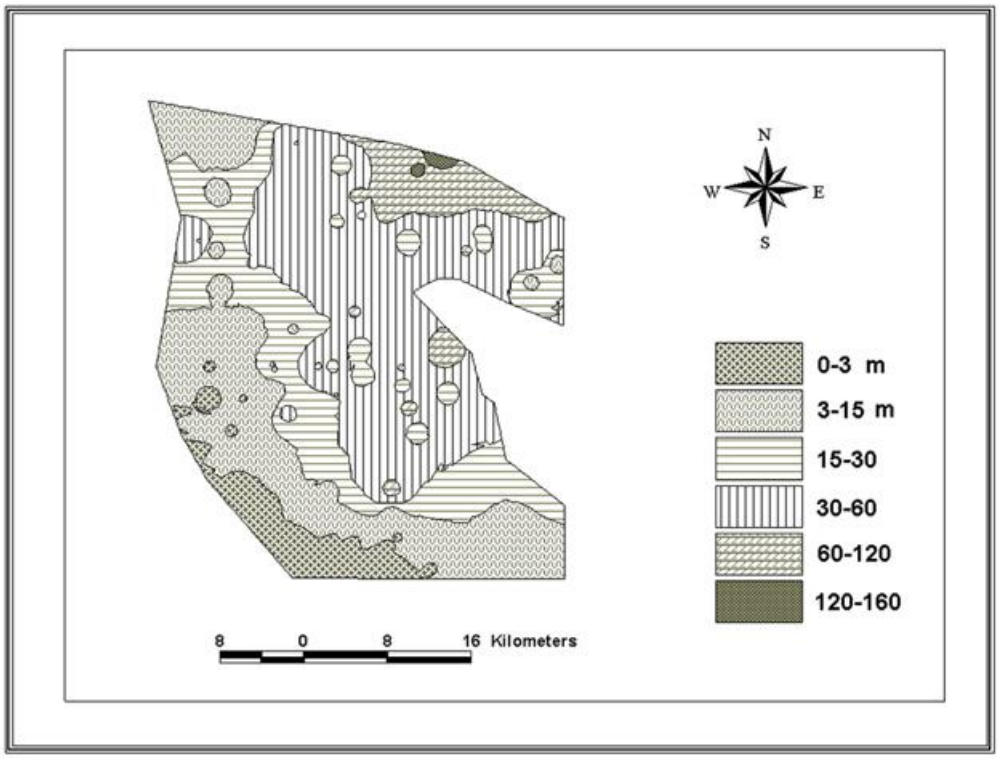

Figure 5.Classification of water table with attention critical groundwater depth (0-3 m)

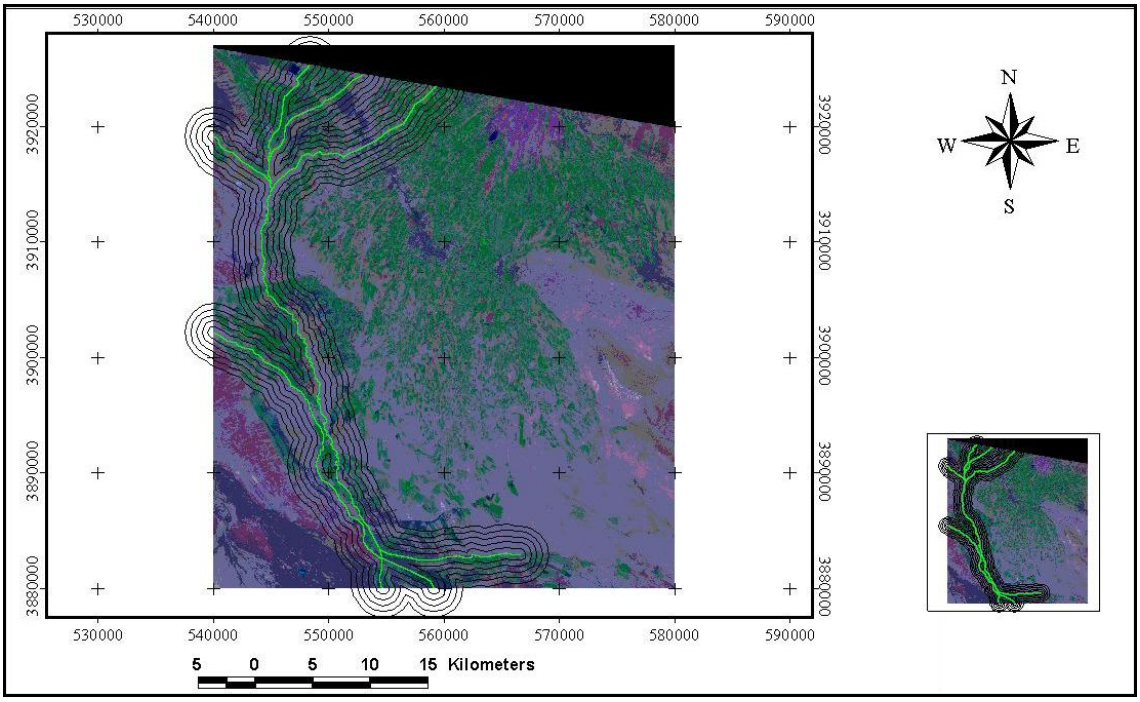

Figure 6.buffer around the jajrud and other branch rivers in Varamin plain

Results and discussion

Image enhancement, visual interpretation and field study showed that along the river spatially on the southern of plain, water logging and salinity problems have been happened. The water logging was distinguished better with 741 false color composite (FCC) than the other FCC. Existence of failure drainage system, fine texture of soils on downstream, reuse of poor quality water to supplement irrigation supplies by the downstream farmers, increased risk of water logging and salinity in the area. . (Figure3)

Figure 4 is showed that water level is more than 940 m above sea level on northeastern of plain and lower than 760 m above sea level on the south and southeastern of plain.
Figure 5 was obtained from water table and its classification with attention ground water critical depth. It shows that the critical mean depth is 3 meter and it's create on south and southwestern, around the jajrud river with areas about 9354 ha.

Also the buffering around the river was created with 5 multiple rings with distance between rings 500 meter (Figure 6). The results from it and field studies showed that because of joint the other branch river with jajrud in the south of plain the soil degradation due to hydro salinity has been happened in around it and natural vegetation like *Tamarix* Sp. & *Juncus Sp*. and *Seidlitzia rosmarinus* have been grown in these areas and the farmlands have been degraded.

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PROPOSED STRATEGY FOR ESTABLISHING A TURKISH ENVIRONMENTAL INFORMATION EXCHANGE NETWORK

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Despite obvious institutional awareness regarding priority environmental issues and the need to implement integrated (multi-sector) management and mitigation, responses remain highly sectoral with little communication and information exchange taking place between environmental institutions. An Environmental Information System (EIS) is designed, developed and built to overcome this problem and is planned to become operational by the end of 2006. However, this is not the end of the road for Turkey; an operational network must be established between the environmental institutions and stakeholders.

This paper aims to present the works done and planned for EIS and draw a road map for Turkey for future implementations. The road map proposed in this paper is to establish a Turkish Environmental Information Exchange Network (TEIEN). This network will be established with the participation of all governmental institutions in environmental sector and will be governed by a commission of their representatives.

Initially, process and results of EU funded "Institutional Building and Access to Environmental Information Project", which is the core of EIS works in Turkey is mentioned briefly in this paper. Afterwards, the vision, rationale and institutional, technical structure of this network and finally, the proposed TEIEN structure is presented.

Keywords: *Turkish Environmental Information Exchange Network, Environmental Information System, information exchange, environmental information.*

1. Institutional Building and Access to Environmental Information Project

1.1 Aim

It was an EU financed project: I***nstitutional Building and Access to Environmental Information***, under the European Commission 2002 Financial Programme for capacity building in the field of environment in Turkey.

The main objective of this project can be summarized as to ensure rapid and reliable exchange of data and information between the environmental institutions, to enable Turkey to comply with the EU Directive on public access to environmental information[36] and the standardized reporting Directive[37] and to support future reporting requirements of national level and international agreements and conventions.

[36] Directive 2003/4/EEC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC.
[37] Council Directive 91/692/EEC of 23 December 1991 standardizes and rationalizing reports on the implementation of certain Directives relating to the environment.

Currently, institutions can only share available environmental data among themselves using official data requesting procedures. This increases the access time to already available environmental data and requires the requester of the data know where the available data resides. For now, there is no such indexing mechanism for available environmental data making the requester reach the necessary data harder. The difficulties in reaching environmental data results with seldom use of it in sectoral policies.

This project aims at establishing an institutional and technical infrastructure for data exchange and thereby mobilizes the existing environmental data and information as well as identifying the needs for future actions to support data production.

For this purpose, an Environmental Information System (EIS) has been designed, developed and built for the MoE&F and it is planned to become operational by the end of 2006. System is almost completed however data entry process is on progress. During all phases of development, EIS beneficiaries and key stakeholders (mainly data providers) have actively participated and contributed to the EIS design and development process. All key stakeholders consulted will be the users and beneficiaries of the EIS.

1.2 Stakeholder Coordination

The stakeholders collect data for their own important purposes. By contributing to the Environmental Information System these stakeholders will benefit from having their data placed in a larger context and having access to a comprehensive repository of available environmental data in Turkey.

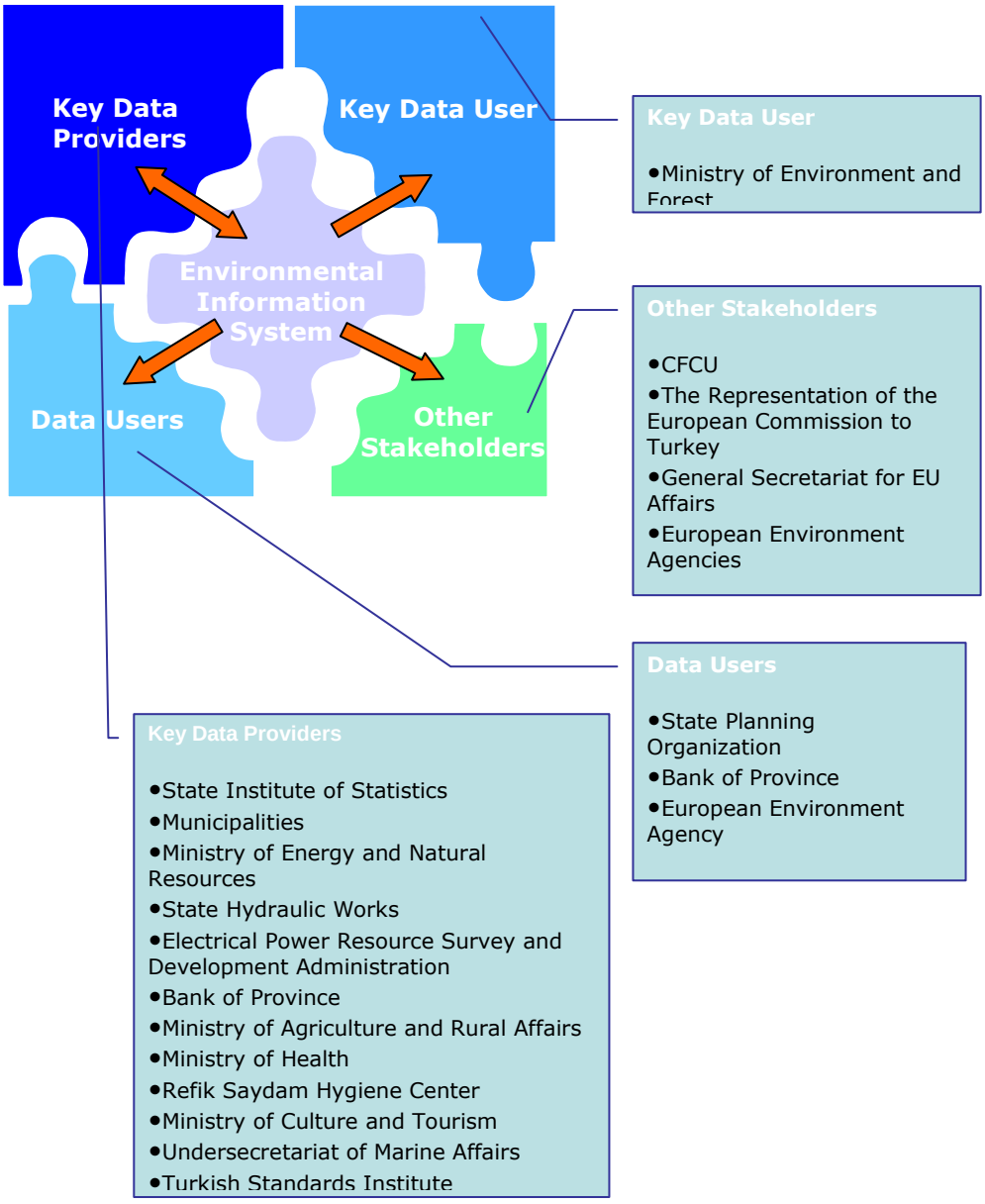
Apart from the MoE&F, there are also other data users such as the State Planning Organization and the Bank of Province who already have access to environmental data and information from some of the data providers. These data users will also benefit from the development of an Environmental Information System and through their work contribute to the overall objective of this project[38].

Several meetings and workshops have been organized for institutional cooperation and coordination since the success of the project was mainly relying on the willingness of the environmental institutions to actively participate in data exchange works. Even though all stakeholders were in the same opinion that EIS was an useful and essential tool, some of the problems occurred during the coordination process, which can be summarized as;

- Some stakeholders did not want to share data because of security reasons.
- Some stakeholders were afraid to give the data free since they were selling the data.
- Some stakeholders were afraid to loose power on their field.
- Some stakeholders do not have regular data storing systematics.

[38] Inception Report, Deloitte, 2004

Figure 1: Stakeholders



With the intense work of project team (ENVINFO and MoEF) they were convinced that the EIS will include security walls that allows the institutions to the level that the data they want to share and it will be beneficial for all sides when they will be sharing and using all available environmental data, which is now disseminated over different institutions.

As a result of one and a half year work, data and information exchange protocols have been signed with stakeholders. This was not the final goal to be achieved in this process. There were still obstacles waiting to be overcome. In spite of all efforts given to convince the stakeholders, some still did not want to share data inside the system and they stated that they will establish their own EIS and afterwards they will make data available to the system. Time has shown that these institutions were not very much in favor of uploading their data in MoEF's servers. These arguments were the origin of preparing a new TEIEN strategy, which will be presented at later pages of this paper.

1.3 Structure of Environmental Information System

Initially the project was assuming that EIS was going to be built on the existing information systems of the institutions. However, while preparing the analysis report (which includes all the current technical, institutional structure of environmental institutions and data availability), it has been understood that there were not any existing information systems of the stakeholders. At that stage, the aim of the project had been shifted to a more simple structure. This structure was thought to be built on a web based system. Each institution was able to access to system and upload, access data via using internet.

The output of the project had also been realized on this idea. The system was based on a central structure. Servers were installed inside the MoEF and web based interfaces enabled all other key stakeholders to load data and access to other institutions uploaded data. The system enabled fallowing functionalities:

- Data entry, query and editing through web interfaces
- Data transfer
- Indicator and thematic map reporting calculation, aggregation and presentation
- Make reporting in line with EU standards and they met the EEA and international agreement needs.
- Data querying as GIS tools on the web (incomplete)
- Display of batch run models results, dynamic run of models as GIS tools on web (incomplete)
- Display of time series data and indicator results as GIS tools on the web. (incomplete)

Figure 3: A screenshot from EIS (Waste Declaration Form)

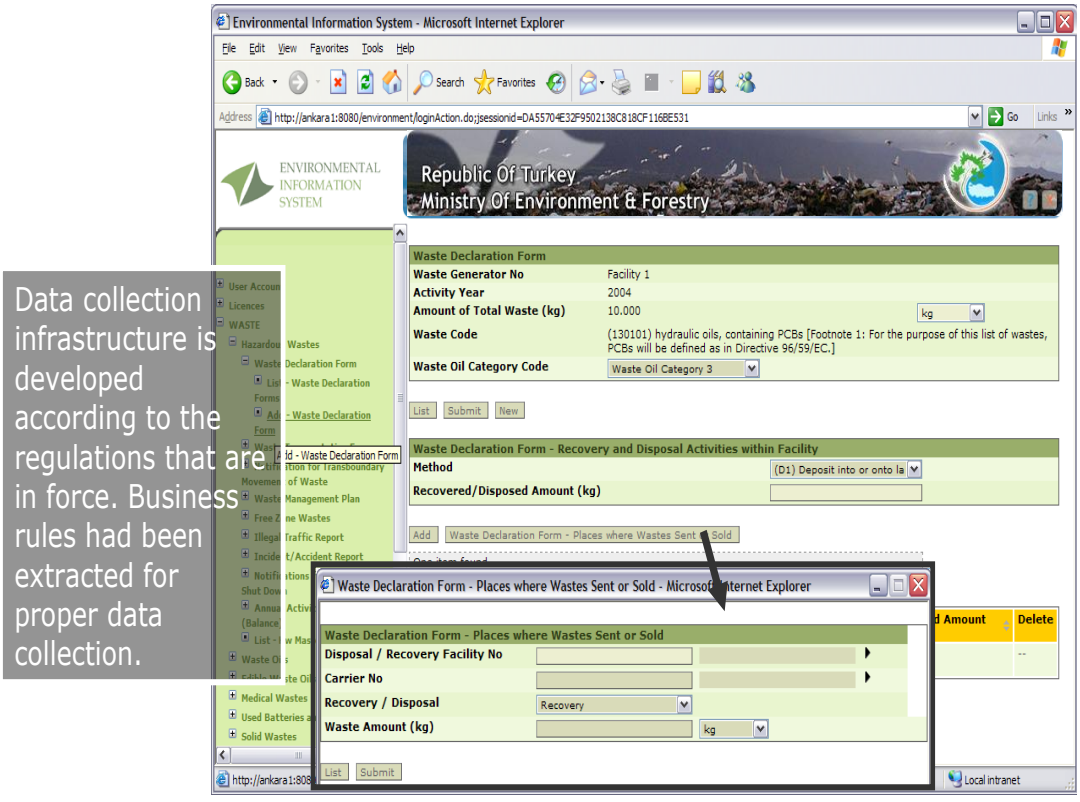


Figure 4: A screenshot from EIS (Common Information Module)

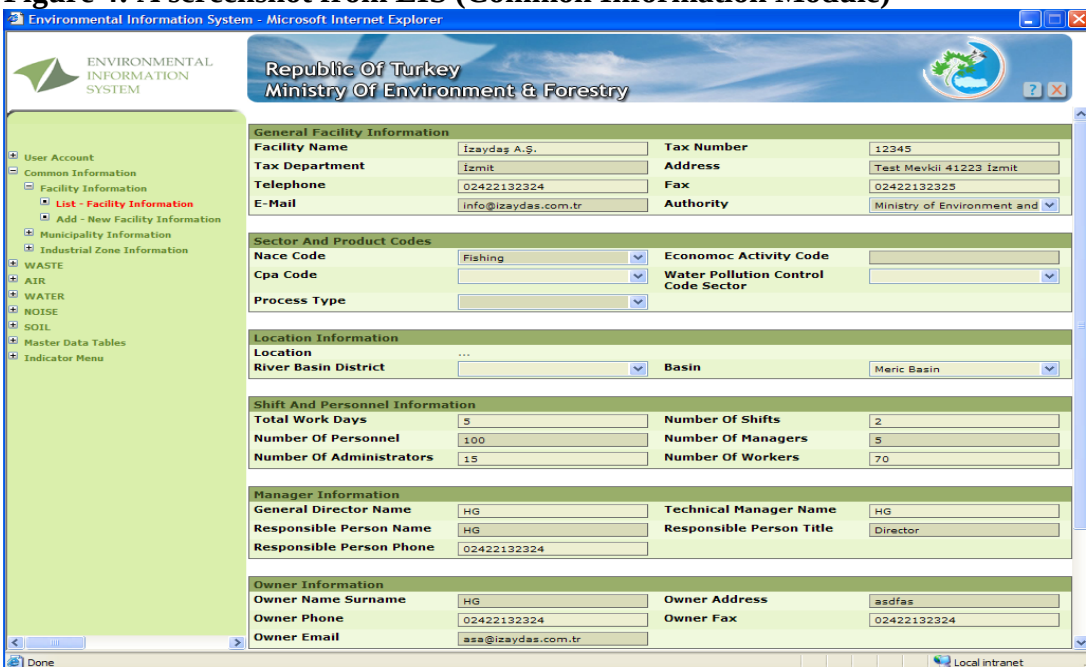
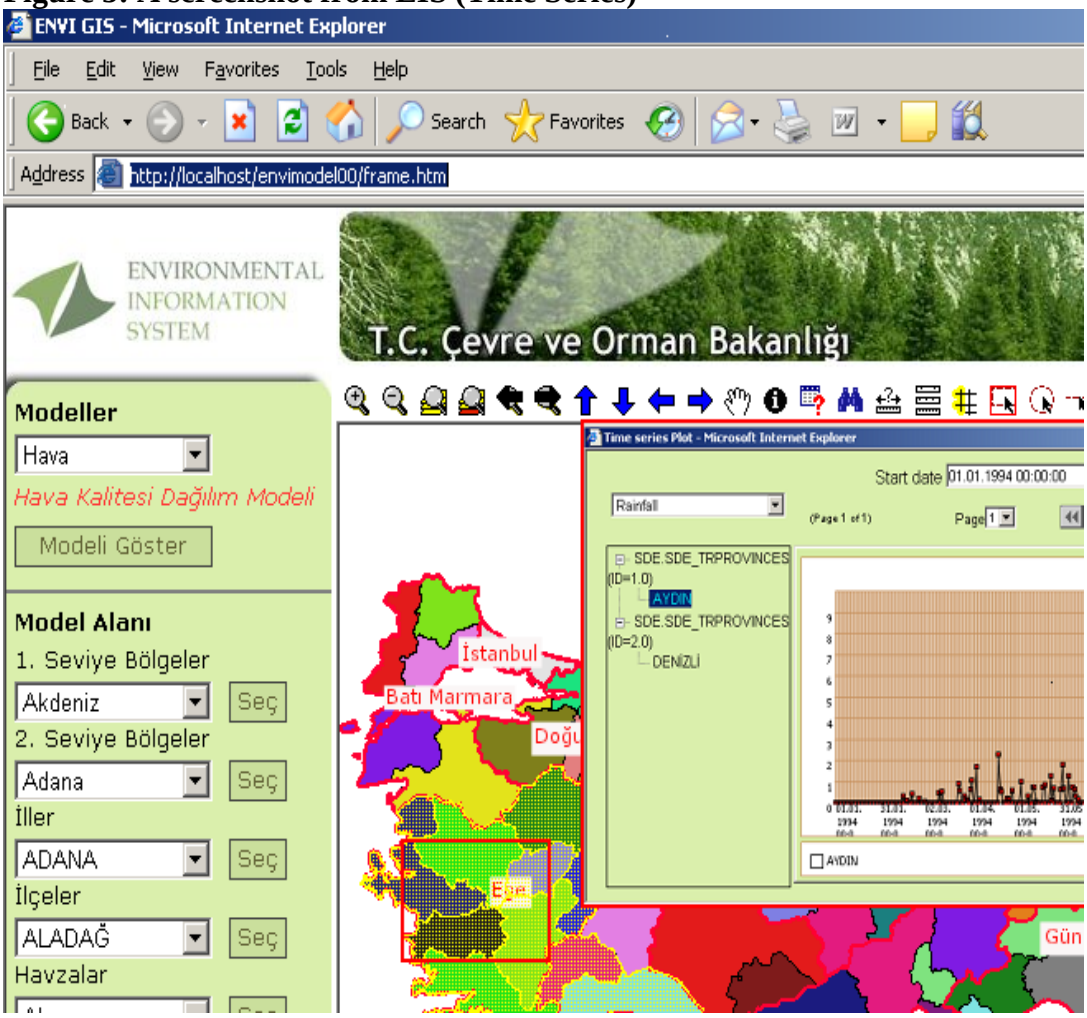


Figure 5: A screenshot from EIS (Time Series)



1.4 Benefits of EIS

The system enables to process the data and create information and present it on web based GIS tools. It is a very rapid tool that is prepared to meet international reporting requirements on air, waste, water fields and national legislation requirements on air, water, waste, soil and noise fields in a standardized way. System will be available both in English and Turkish.

Furthermore, it will ensure healthy and rapid exchange of data and information, rapid process and evaluation of data, provision important amount of data and information for the preparation of policy, plan and programs, alternatives provided to decision makers, money, time, work power saving, standardization of data, strong coordination and cooperation between institutions and public access to information.

2. Turkish Environmental Information Exchange Network (TEIEN)

2.1 Rationale

Actually, system output of EIS project is both central and disseminated. It was central because information is being collected in MoEF servers. It is disseminated since data can be loaded and uploaded via web based interfaces. This system had not been widely accepted by stakeholders. As it was also stated before, they were not willing to upload their data to MoEF servers. It has been understood that only the dissemination of servers to each stakeholder would make them feel safe and create ownership.

A second lesson from the previous project was “power” problem. The process had shown that “data” and “information” were recognized as a sort of power by the stakeholders. Some sort of power conflict drawbacks arised. This reaction was also an indicator of the absence of information on environmental information systems.

Some stakeholders even did not have the necessary means, systematic and qualified staff to upload the data to EIS. At this stage, it became clearer that each institution should have their own EIS, should learn by doing first and when these systems become operational and an institutional culture is established, they should be connected to each other and this structure should be managed by a commission consist of all stakeholders.

Final goal is now determined as establishment of TEIEN, which will rely on a countrywide disseminated information network, sophisticated decision support systems (DSS), and monitoring systems. The TEIEN is assumed to be a functional and effective Inter-Institutional Partnership, established to support sustainable National Policy, Programming, and Planning.

2.2 Proposed organization of TEIEN

The Amended Environment Law (26/04/2006) that details the role, function and mandate of the Ministry of Environment and Forestry in matters of environmental management and protection. The Law also gives MoE&F the right to request environmental information from all national sources[39].

Thus, MoE&F is the principal national authority mandated to manage the environment in the Republic of Turkey. As such, the MoE&F would logically be the principal authority requiring and utilizing environmental data and information. Though this is correct to a certain extent, current inter-sectoral policy, programming and planning processes common to modern governments demand that this information originate from and be available to all sectors of government at central, provincial and municipal levels.

To meet the complex requirements of government, TEIEN must be managed to reflect the needs of both the government (at all levels) and its institutions. To that end, the organization and management of TEIEN must be inclusive and representative of the population of institutional users.

A **TEIEN Management and Oversight Commission** whose members would be representative and appointed from the stakeholder (member) institutions would be overall responsible for the management of the TEIEN. The Commission would be the executive body taking all decisions related to the prioritizations and realization of issues related to the functioning and development of TEIEN in accordance with an Implementation Plan approved by the members. This responsibility would also include ensuring the relevant connections between the TEIEN and other ongoing and future projects in Turkey.

The Commission will ensure that TEIEN becomes operational and, to that end, will work to secure the necessary funding from both national and donor sources. The Commission will approve new members after completing preparedness and quality checks and will later provide new members with technical support as needed for inclusion in the network. The Commission will also be the body responsible for approving software and hardware changes and will communicate those changes to all network partners to ensure that system integrity and function are maintained.

The TEIEN Management and Oversight Commission will be a distinct body separate from already established e-Government commissions. The TEIEN Commission will ensure that exchanges between member institutions and authorities are compliant to approved and agreed standards and, as such, is a guarantor of network integrity and security. Likewise, the commission functions as a body to ensure that systems and processes are developed and implemented to provide information to civil society according to the *Act on the Right to Acquire Information: Number 4982 of October 2003*.

[39] Amended Environmental Law Numbered 5491, 26/04/2006, annexed Article 7.

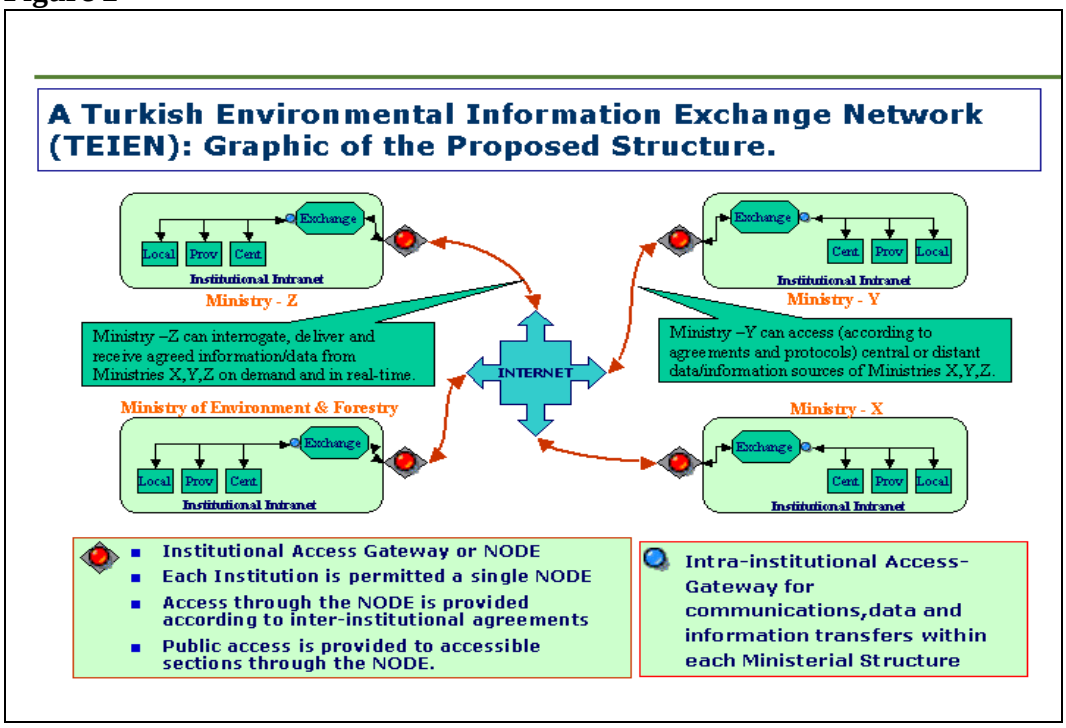
The role of the MoE&F must be both pivotal and fundamental to TEIEN. As such, it is proposed that the MoE&F becomes a permanent member of the Oversight Commission and takes up its chairmanship which will be endorsed by the members. The managerial daily tasks of the Commission should be undertaken on a day-to-day basis by a relevant unit within the MoE&F.

2.3 Technical Framework

In line with e-Government legislation, each state institution at central, provincial and municipal levels will be equipped with sufficient IT capacity to enable the transfer of information and respond to public demand for information and services. TEIEN will build on this capacity through the introduction of dedicated access nodes or gateways specific to the transfer of environmental and environment related data and information.

Data and information exchange between institutions will be according to signed, legally binding agreements or inter-institutional protocols. These agreements define the level of access, data and information standards, standard data exchange templates, a standardized organization of data dictionaries and metadata files and other relevant information as required by each participating institution. A schematic of the proposed TEIEN is presented in Figure 2.

Figure 2



The basic concept of all this system is that each institution collecting, processing and assimilating information is ultimately responsible for the quality, standard and maintenance of that data and information. As such each institution or collecting body retains that data and information and makes it available to its partners on the basis of legally binding bilateral or multilateral agreements/protocols.

The principle of ***"data mining"*** is used to access data and information. Each institution or data collecting body participating in the Network details its data and information holdings through data dictionaries and linked metadata (data description) files. Each institution requiring data and information enters into an agreement with the institution holding the material and accesses - "mines" - the data/information as needed.

2.4 Exchange node management

The management of the MoE&F node should be considered in connection to the Management of the central gateway in case the e-government central gateway is not used. Also the support to the chairmanship of the TEIEN Management and Overlook Commission and the responsibility for the day-to-day management of the TEIEN should be considered in this context.

Given these needs related to the management and the development of TEIEN and the prominent position of the MoE&F within the network provides an opportunity to concentrate and consolidate the functions of data and information Departments and Divisions into a single data/information management structure. This approach, in line with the Governments' Concentration Policies, would improve efficiency, reduce costs and limit the duplication of institutional functions. The concentration is proposed within the context of streamlining of government functions and services. Streamlining, within the context of the MoE&F would lead to considerable cost savings and improved service delivery both to concerned government institutions and to civil society[40].

3. Conclusion

A new EU project is already proposed with the purpose of establishing TEIEN in Turkey. In the context of the new project, stakeholders will be supported to establish and operate their own EIS. These systems then will be connected to each other.

Currently the aim of Turkey is to establish an institutional culture, know-how on information technologies and environmental information systems. In this transition period, current web based EIS is essential but not sufficient. Until the establishment of TEIEN is completed, EIS will fill be a tool for accessing, querying and sharing environmental information as well as it will be a training area for stakeholders. In addition to this, two years of experience increased the amount of knowledge and awareness and created an amount of cooperation.

Turkey plans to establish TEIEN at the end of 2009. Once operational, it will enable reaching environmental information electronically over a single network. By overcoming the difficulty in reaching data, integration of environmental concerns into sectoral policies is planned to be increased, which will result in improvement of environmental management.

[40] National Strategy Document,2005 ENVINFO Project Team and MoEF, is widely used in TEIEN chapter.

The analyses made during the "Institutional Building and Access to Environmental Project" showed also that there are serious gaps in collecting environmental data. To be able to get reliable environmental data, investments related with the monitoring systems should also be accelerated. Environmental data mostly collected by the inspections and there is lack of regularity and automated systems. In order to reach to the aim of a fully operating TEIEN, the effort of MoEF is not sufficient. The stakeholders should also take the necessary measures to establish automated data collection and monitoring systems, which will lead to collection of reliable and timely data necessary for establishing sophisticated decision support systems.

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3. Inception Report, Deloitte, 2004
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A DECISION SUPPORT SYSTEM FOR WATER RESOURCES MANAGEMENT

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The integrated management of water resources at the river basin scale is a complex problematic taking into account its multidisciplinary nature. The institutions responsible of this task face problems in managing an enormous quantity of information that it is necessary to the decision makers. This requires not only the relevant information but also models and Decision Support Systems (DSS) fitting the needs of water administrators. The hydraulic basin agencies, recently created in Morocco, are looking for systems capable to organize spatial and descriptive data while providing the necessary elements to the integrated management of water resources.

This paper deals with the development of a Decision Support System (SADGEB) based on information technologies [Geographic Information Systems (GIS), remote sensing and database management systems] and on simulation models to create a support decision environment which fulfills essential needs of river basin agencies. The developed system arranges a spatial database under the ArcView GIS, a descriptive database under Access containing the technical and socioeconomic data and simulation models that calculates water balance and assess scenarios of water resources management and planning. The system has also a user interface that permits to answer user's requests through menus, preprocessors and postprocessors used to prepare entry data to models and to present results.

I Introduction

The important development registered these last years in the field of information technologies and techniques of modeling hydraulic process offer a favorable framework to the development of Decision Support Systems (DSS). These systems are an absolute necessity for institutions that manage rivers basins and the regional development. Such systems attend decision-makers concerning the management and assessment of water resources at the scale of a river basin. These tasks require hydrologic, environmental and socioeconomic data, information about water quality, land cover and infrastructures. DSSs can play a major role in assessing impacts of economic activities and changes of climatic conditions and land cover on the water resources management and planning.

The present paper presents an integrated decision support system capable to provide the adequate information to decision-makers in order to permit them to control water related problems and to assure a perfect adequacy between water resources availability and needs, while preserving the environment.

The SADGEB system is conceived on the basis of integration of the ArcView GIS, the Access database management system, and simulation models: HEC-HMS for hydrologic modeling, RIBASIM and RIVER for water resources management and planning.

GIS is used to organize, analyze and present a multitude of spatial coverages. It plays a key role in preparing the necessary data for simulation models. Special preprocessors are developed to combine spatial information worked out under GIS with data stored under ACCESS to simulate the behavior of the basin further to a hydrologic event and to evaluate its hydraulic performances for different scenarios of water resource development.

II Benefits for the management of water resources

The river basin is an ecosystem where interact natural components as soil, topography and climate with other factors related to human activity. Infrastructures, administrative limits of provinces, townships, cities and villages are part of the basin whose size is a factor influencing water resources management. Components of hydrologic cycle occur inside the basin limits and hence, all economic development must be planned and managed within this natural unit in order to assure its durability.

Water users activities have direct repercussions on water resources in quantitative and qualitative term. These impacts and water needs evolution must be mastered by decision-makers so they can account for all stakeholder objectives. A ADSS is much more comprehensive than traditional methods of decision-making. It is capable of aggregating all competing objectives to identify the best optimal strategy of water resources development. To attend this objective, it is necessary:

- to characterize the river basin by defining the sub-basins, topography, climatic and hydrologic data, potentialities in surface water and groundwater and the land cover ;
- to arrange relevant information on infrastructures, population, agriculture, tourist and industrial activities and on perspectives of each sector development ;
- to have tools to analyze processes that occur within the basin in order to allow decision-makers to control the problematic of water resources, based on a multi-criteria approach ;
- to be able to visualize information in order to control all factor that influence the water resources management and planning ;
- to have the possibility to get information easily in familiar formats (spreadsheets or graphical displays).

To fulfill these goals, authorities in charge of water management, the Hydraulic river Basin Agencies in the Moroccan case, require a system permitting the management of an enormous quantity of data. The DSS is both a process and a tool fully adapted to this request. It collects, organizes, processes information, and leads decision-makers through the task of evaluating scenarios that best solve their problems.

III Design of SADGEB

III.1 Conceptual framework of the System

It is evident that the architecture of all DSS is influenced by tasks that are assigned to it. Concerning the SADGEB system, its structure was conceived around three main components (figure n° 1) in order to fulfill to the following objectives :

- the management of an important database fitting to what is required by the problematic of the integrated water resources management ;
- the calculation of water balance for the basin and the assessment of hydraulic performances of reservoirs with the help of the RIBASIM and RIVER models ;
- the forecasting of flood hygrograph to each point of the river network with the HEC-HMS model;
- Pre-processing and post-processing for simulation models ;
- the use of GIS performances for the analysis, management, manipulation, updating and information visualization as well as for the preparation of entry data to simulation models ;
- the development of an interactive and convivial user-interface that connect decision-makers directly to models allowing them to address their requests to the system and visualize results.

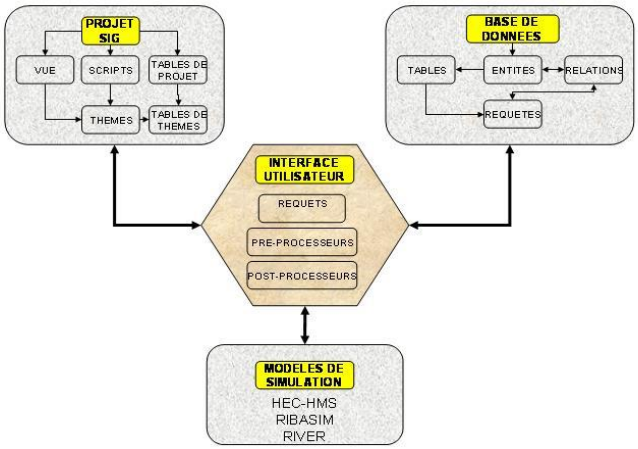

Figure 1 : Architecture of the SADGEB System

III.2 Components of the SADGEB
III.2.1 Database under Access

The database under Microsoft Access plays a major role in managing an enormous quantity of information that characterizes factors to be taken into account in the problematic of water resource management. The GIS are reputed for their insufficiency to manage such a mass of data to non spatial character and even less data describing some time variable phenomena. Also, we opted for the structuring and storage of the relevant information in relational attribute tables (figure 2).

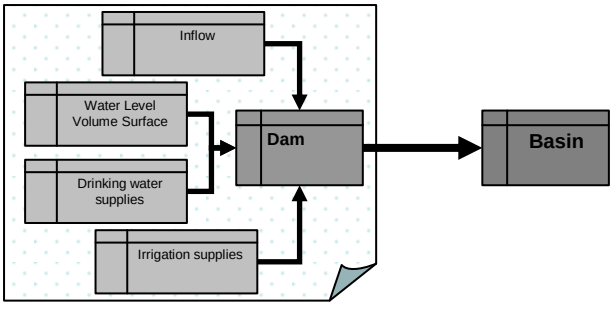

Figure 2 : Example of Entities-Relationship : case of the dam entity

III.2.2 Spatial database

This component of the system is destined to organize, manipulate, and display a varied set of coverages. But its most important role consists in the preparation of the necessary parameters to simulation models by coupling data coming from remote sensing (land cover) and data worked out from the Digital Elevation Model (DEM).

The system interface allows decision-makers to display different spatial themes regrouped in the GIS database under ArcView (administrative limits, land cover, infrastructures, DEM, sub-basins and river network, hydrologic and climatic stations…). Special scripts were developed with the ArcView programming language "Avenue" to join theme tables to the Access tables in order to update some coverages from the Access database.

The central role that plays the spatial database in the SADGEB is schematized in the following figure.

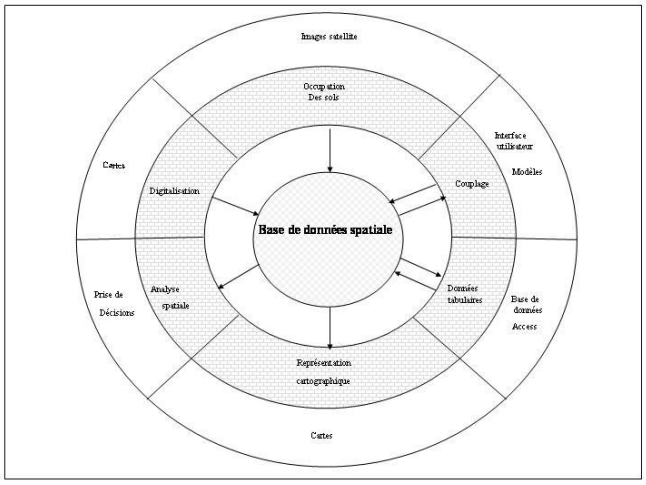

Figure 3: Role of the spatial database

III.2.3 Simulation models

The SADGEB includes to this stage of its development: 1) the HEC-HMS model that uses a set of hydrologic methods and the technology of GIS for Rainfall-Runoff modeling, 2) the RIBASIM model (**RI**ver **BA**sin **SIM**ulation), developed by Delft Hydraulics, that is a powerful tool that permit to elaborate optimum operational plans for water supply management, taking into account competing objectives 3) the RIVER model, developed by MOTOR COLUMBUS (Switzerland), that is a mathematical simulation model of the water regularization by a hydraulic system. This model doesn't arrange a user-interface had required the development of a pre-processor and a post-processor that permitted its total integration in the SADGEB system (Figure 4).

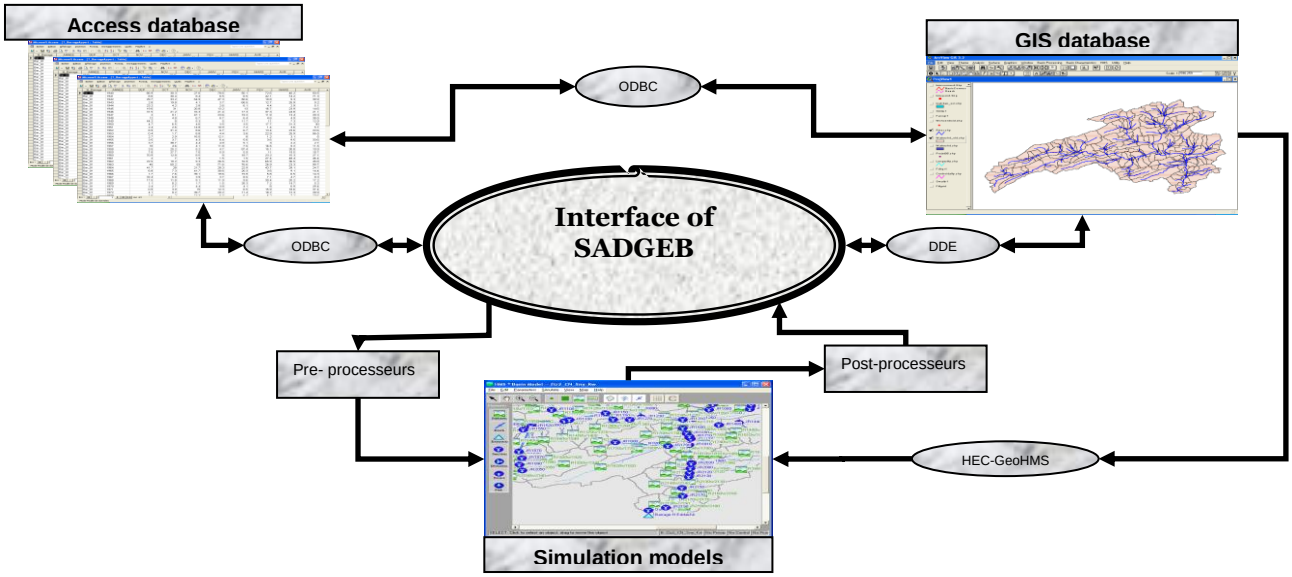

Figure 4: Diagram of integration of SADGEB components

III.3 Main functionalities of the SADGEB

III.3.1 Database under Access

The system gives the possibility to enter, visualize and update information stored in the Access database. For example, the hydrologic and climatic time series can be visualized for a chosen event. These data are used to prepare inputs to HEC-HMS (figure 5).

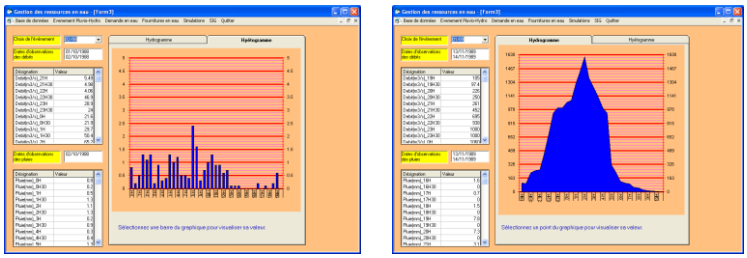

Figure 5: Hyetograph and corresponding Hydrograph

III.3.2 Water demands

The evolution in time of water demands is a deciding factor for water resources management and planning. Decision-makers can retrieve the relevant information allowing them to set up scenarios assuring adequacy between water resources and water needs.

The water demand is presented to the user by type of consumption (rural drinking water, urban drinking water, water of irrigation and water demand of isolated industries) within the chosen geographical space (ex. a particular sub-basin, a township…). The user has the possibility to get detailed and synthesized information for consumers inside the chosen spatial entity (face 6).

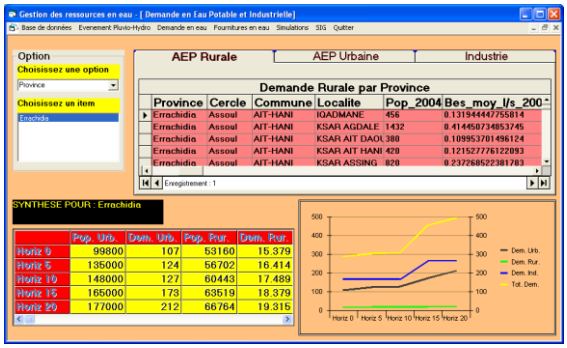

Figure 6: sub-menu "Water demand"

III.3.3 Water supply

Water volumes taken into account are withdrawals from watertables and releases from dams. We omitted direct withdrawals from river network and waste water reuse that are generally less known.

Decision-makers can get information about historical volumes of water intended to drinking water supply and other uses. The detail and the synthesis of consumptions are given for surface waters and groundwater. The following figure replicated the window presenting water supplies from a given dam.

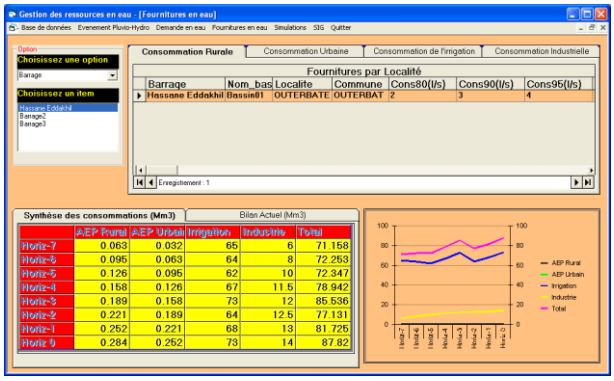

Figure 6: Sub-menu " Water supply"

III.3.4 Simulations

The system processes the necessary information for HEC-HMS, RIBASIM and RIVER models. Decision-makers can use these tools to assess flood impacts, to develop long-term regional water supply plans, and optimum operational plans for water supply management.

IV Conclusion

The SADGEB system proved its utility and its efficiency through applications in rainfall-runoff modeling and the assessment of scenarios of water management and planning in the "Haut Ziz" river basin in the Southeast of Morocco. The system is composed of models suitable to the most important aspects of water resources management and thus offers an environment of decision making. Thanks to its conception and to its architecture, this tool can evolve toward a more effective system by the improvement of coupling between its components and the integration of other models as hydraulic models (HEC-RAS for example), hydrogeological models, models of water quality, and economic models.

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ENVIRONMENTAL INSITE: AN ENVIRONMENTAL INFORMATION SYSTEM USED FOR ASSESSING GROUNDWATER QUALITY IN MERSIN

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Diffuse pollution of water resources from agricultural and industrial sources is a major environmental issue in Mersin. These attempts require methods and tools for spatial analysis to provide a coordinated approach for solving environmental problems. This paper presents a monitoring model, developed in a GIS environment, for the assessment of pressures from agricultural land use and industrial activity and the consequent impacts on groundwater. Environmental Insite has been applied at regional scale, with focus on nitrogen pollution from chemical fertilizers and manure and heavy metal pollution from industry.

The City of Mersin is underlain by the phreatic Mersin aquifer. The Mersin aquifer has several lithologies, dominated by gravel, sand and clay. The thin soil horizon makes the aquifer prone to pollution, caused either by accidents such as spills or by carelessness due to unsupervised dumping. The almost high permeability of the phreatic Mersin aquifer imply that leakage of surface waters, septic-tank spills, sewer-bursts, chemical and industrial contaminants and other such materials can reach the aquifer in unusually high rainfall years. The effects of fuels and oils are much more adverse, than they may remain in soils for long periods. The rapid urbanization and building of informal settlements without sewage reticulation has increased the risk of pollution to the Mersin aquifer. The close monitoring of sewage pipes, filling stations and dump sites (including cemeteries), preferably using a GIS-based model, is the best way to prevent future pollution.

Groundwater quality of Mersin coastal aquifer was investigated by means of in-situ measurements and chemical analyses. Groundwater's temperature, pH and specific electrical conductivity are found to range between 15.5-25^{o} C, 7.2-8.2 and 689-1989 µS/cm. In considerable number of samples NO_3-N, Cu, Fe, Mn exceeds drinking water limits.

Key words*: Mersin, groundwater quality, environmental information system*

INTRODUCTION

The dense industrial and agricultural land use affects the groundwater quality negatively in Mersin region. Groundwater investigation and remediation design are mature engineering disciplines with established protocols for handling a variety of contaminant products in different media. The principal challenge at many sites is to understand the complicated, site-specific relationships between constituent concentrations as they play out over space and time and then to communicate this information and its implications to clients and a concerned public. Insite is designed to integrate contaminant and other environmental data, so as to allow the user to *look beneath the surface* and convey that understanding to his or her client

(Environmental Insite Tutorial, 2005). Mersin and Tarsus cities are situated on the Mersin aquifer, which is a phreatic aquifer and Mersin aquifer is in hydraulic contact with the Mediterranean Sea and sea water intrusion has been induced by overexploitation of groundwater (Demirel, Z., Külege, K. [2004]).

Using the results of many parameters, iso-concentration maps, classed post and 3D post maps are produced with GIS (Environmental Insite 3.0) and the seawater pollution, agricultural pollution and industrial pollution areas are marked in the region. Seawater intrusion is also observed in a few sites.

MATERIAL AND METHODS

The fieldwork included water quality measurements (pH, EC and temperature), well inventory and collection of water samples from dug and bore wells.

Heavy metals in groundwater were measured with Hanna C200 multiparameter photometer. Hanna C 200 Series is a line of 15 different bench, microprocessor based photometers that measure up to 46 parameters in water and wastewater.
Electrical conductivity (EC), temperature (T) and pH were monitored during pumping. Measurements of EC and pH were made in the field using a pH/Cond 340i WTW meter.

The locations of the wells which have permissions from the state (DSI) and geological logs have been determined by a GPS from Garmin and by using EnviroInsite a GIS are constructed. The geological logs and well-construction plans are plotted and the wells which produce water from alluvial aquifer are classified. By using EnviroInsite the geological information are correlated and some geological cross sections and fence diagrams are plotted. Contours can be generated in plan, on profiles and in three dimensions. Gradient arrows can be constructed in plan and on sections to indicate the direction of flow based on measured head values. Both constant length and variable length (proportional to the gradient magnitude) arrows can be constructed.

GEOLOGY AND HYDROGEOLOGY

The oldest rock unit of the study area is Karahamzauşağı Formation of Paleozoic age. In the northwestern, the ophiolitic rocks are settled. This basement rock is overlain by Oligo-Miocene aged Gildirli; Early-Middle Miocene aged Karaisalı and Güvenç Formations, which are composed mainly of conglomerate, limestone and dolomite (Fig. 1). These formations are overlain by Middle-Upper Miocene aged Kuzgun and Upper Miocene aged Handere formations. Kuzgun formation consists of sandstone, conglomerate, limestone, and tuff-marl-shale and sandstone alternation (Şenol, M. and others. 1998). The Handere formation is composed of clay stone-marl-siltstone, limestone and gypsum and sandstone-conglomerate series. The Berdan plain is filled with Quaternary sediments. The thickness of alluvium ranges from 30 to 100 meters. Alluvial deposits are composed of clay, silt, sand and gravels (Fig.2 and 3). Caliches took place in the northern part of the study area (Fig. 1).

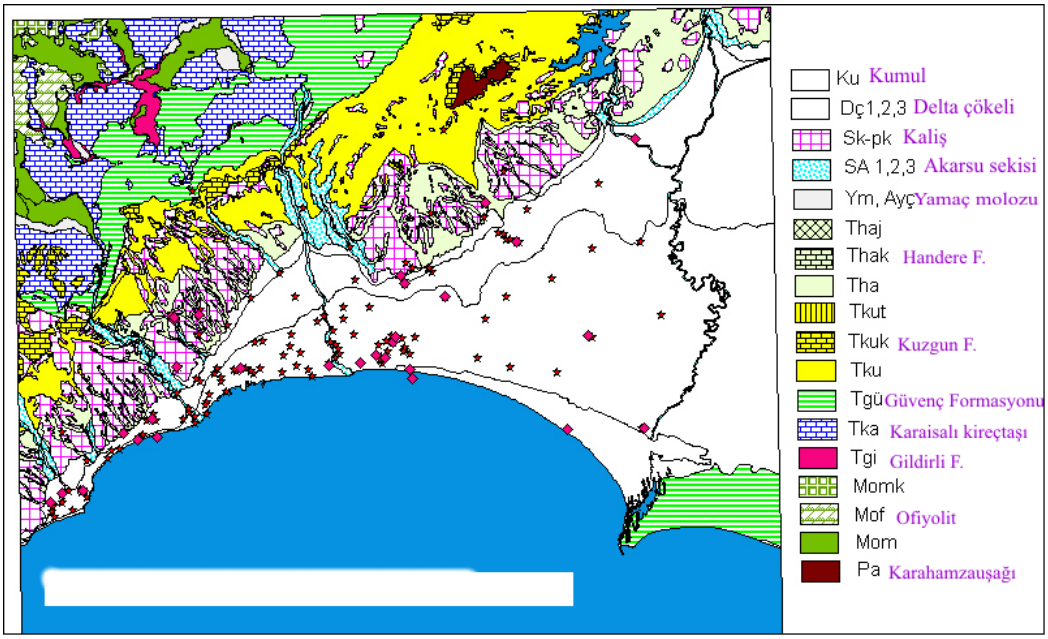

Figure 1: The geological and well location map of the studied area

The conglomerate, sandstone and limestone which are found mostly on the upper levels of the Handere formation form aquifers. The gravel and sand deposits of alluvium form the most productive aquifers in the study area. Although almost all of the wells drain the alluvial aquifer, some of them drain Handere aquifer too (Fig.2 and 3).

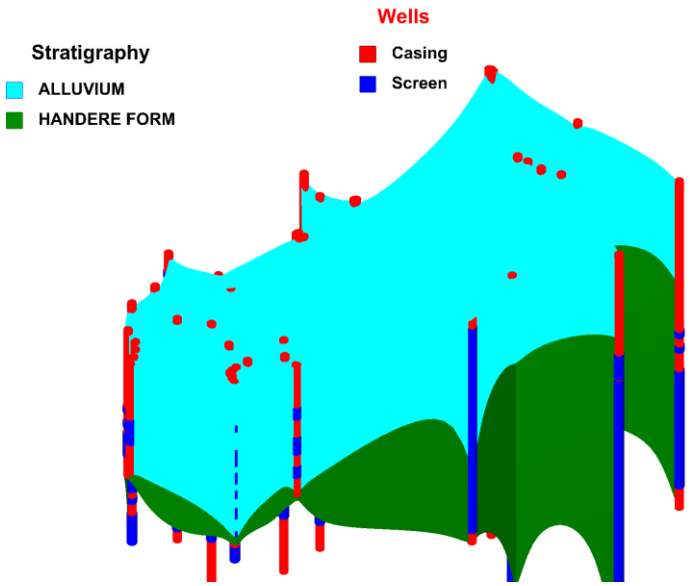

Figure 2: The wells drained the two aquifers (constructed with Environmental Insite)

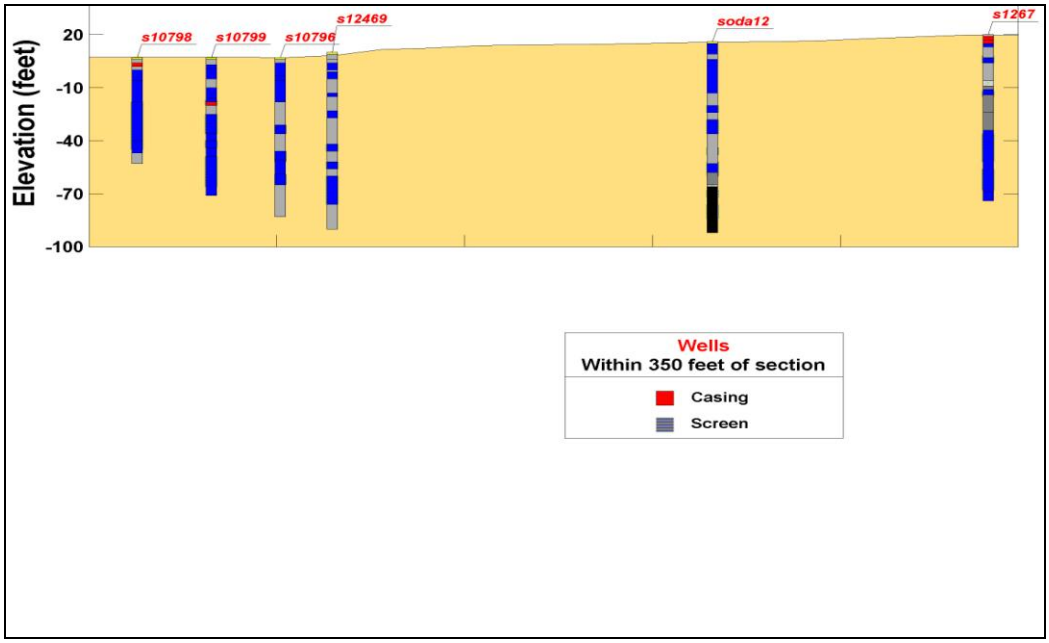

Figure 3: Cross section of aquifer (constructed with Environmental Insite)

The recharge rate of the alluvial aquifer is determined as $74x10^6$ m^3 per year. The Berdan River also recharges the aquifer. The direction of groundwater flow is from northeast to south and southwest (Demirel, Z., Türkmen, S., 2001).

RESULTS

The dominant ions in almost all the samples are Ca^{2+}, Mg^{2+} and HCO^-_3 (Fig. 4). This is a result of the geological characters of recharge areas of the aquifers composed mainly of carbonate rocks. The existence of gypsum in the Handere Formation causes SO^{2-}_4 as being one of the dominant ions. Especially the groundwater around the Mezitli town is strongly affected by SO^{2-}_4.

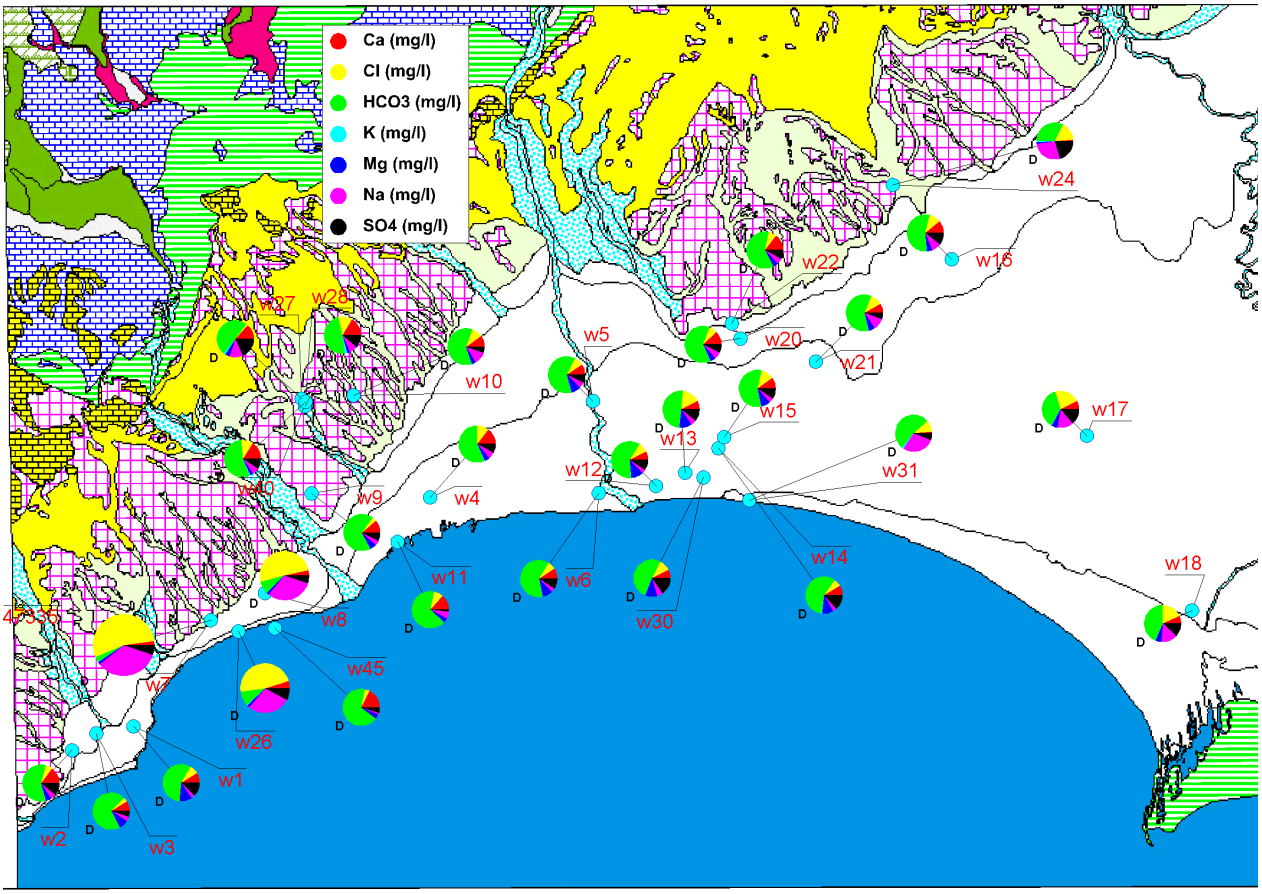

Figure 4: Chemical types of Groundwater samples

Water samples for photometric analyses were obtained from 20 selected wells (Fig. 5) and from one point at the sea. Electrical conductivity (EC), pH and water temperatures were determined at the borehole head by WTW pH/Cond 340i and the data were stored in Environmental Insite 3.0 (Table 1).

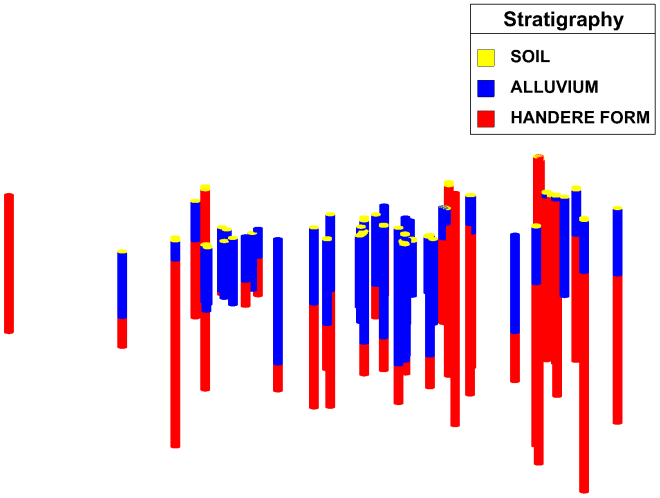

Figure 5: Sampling wells and their 3D view (constructed with Environmental Insite)

Table 1: The results of the groundwater quality determination by photometric methods

No	T	pH	EC	NO^{-}_{2}	NH_3	PO^{3-}_{4}	F	Br	Cr	Fe	Zn	Ni	Cu	Mn	Mo
1	23,0	7,40	2330	0,00	0,00	1,40	0,39	0,31	0,00	0,11	0,22	0,08	0,13	0,1	0,1
2	25,9	7,38	867	0,00	0,00	2,80	0,24	1,66	0,00	0,03	0,58	0	0,16	0,1	0,0
3	26,8	7,70	793	0,00	0,00	0,00	0,33	0,00	0,00	0,08	0,30	0	0,12	0,4	0,2
4	23,4	7,10	1153	0,00	0,00	0,00	0,48	0,00	0,00	0,05	0,17	0,01	0,05	0,1	0,0
5	22,3	7,80	272	0,00	0,00	0,00	0,27	0,89	0,00	0,03	0,12	0,00	0,00	0,0	0,0
6	22,3	6,75	1475	0,00	0,00	0,10	0,33	0,05	0,00	0,62	0,48	0,00	0,00	0,3	0,1
7	21,8	7,25	1025	0,00	0,00	0,00	0,69	0,00	0,00	0,05	0,22	0,00	0,00	0,1	0,0
9	25,7	7,24	1046	0,00	0,05	0,00	0,51	0,00	0,00	0,08	0,16	0,00	0,00	0,3	0,0
10	22,2	6,87	1043	0,00	0,00	0,10	0,46	0,04	0,00	0,08	0,30	0,20	0,04	0,1	0,0
11	24,9	7,19	898	0,00	0,00	-	0,45	0,05	0,00	0,08	0,16	0,00	0,00	0,1	0,0
12	23,3	6,90	1060	0,00	0,00	-	0,45	0,04	0,00	0,09	0,22	0,00	0,13	0,0	0,0
13	26,1	7,05	1073	0,00	0,00	0,00	0,61	0,04	0,00	0,14	0,33	0,00	0,01	0,2	0,2
14	23,0	7,14	890	0,00	0,05	0,00	0,51	0,11	0,00	0,03	0,10	0,00	0,23	0,2	0,0
15	27,7	7,34	1004	0,00	0,05	0,00	0,28	0,02	0,00	4,53	0,70	0,00	0,13	0,0	0,1
16	22,3	7,33	1254	0,00	0,00	0,00	0,61	0,02	0,00	4,75	0,48	0,00	0,6	0,1	0,0
17	22,0	7,25	1650	0,00	0,00	0,00	0,71	0,07	0,00	0,68	0,17	0,00	0,12	0,0	0,0
18	31,2	7,52	1096	0,00	0,03	0,60	0,55	0,00	0,00	5,22	0,80	0,00	0,15	0,0	0,0
19	26,2	7,65	990	0,00	0,06	0,10	1,08	0,00	0,00	0,20	0,52	0,00	0,06	0,0	0,0
20	22,6	7,64	894	0,00	0,05	0,40	0,97	0,00	0,00	0,09	0,29	0,06	0,04	0,1	0,5
25	21,8	7,44	972	0,00	0,12	0,00	0,58	0,00	0,00	0,02	0,20	0,00	0,16	0,1	0,0
30	29,5	8,10	50000	0,00	0,50	0,00	12,5	2,78	0,00	0,45	0,19	0,02	0,65	0,0	0,0

The electrical conductivity (EC) of groundwater depends directly on the mineralization of water. The ECs of the groundwater in Mersin aquifer and sea water are determined as around 1000 µS/cm and 50 000 µS/cm, respectively (Table 1). The EC-thematic map shows that EC values in groundwater are over 1000 µS/cm around Mezitli, Karaduvar and Kazanlı towns, which are located much closed to sea and this is an indicator for the sea water intrusion. The gradient vectors show the intrusion direction (Fig. 6, 7 and 8)). The Cl^- concentrations thematic 3D view support the sea water intrusion too (Fig. 9).

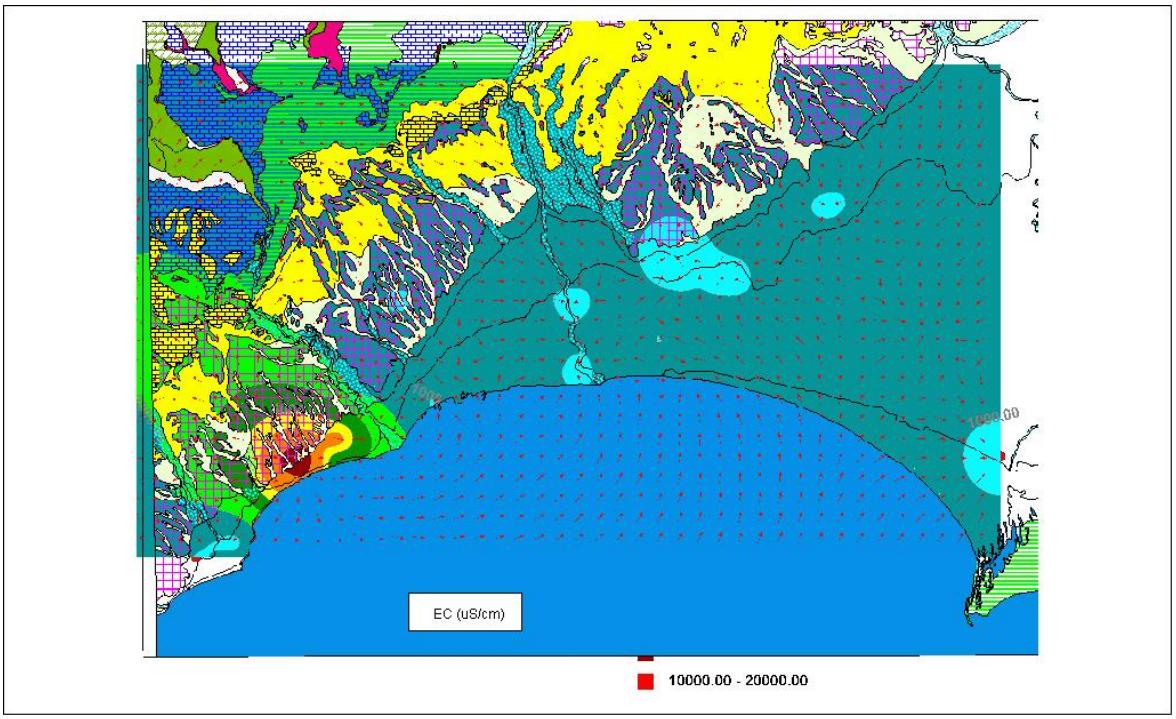

Figure 6: The EC thematic map (constructed with Environmental Insite)

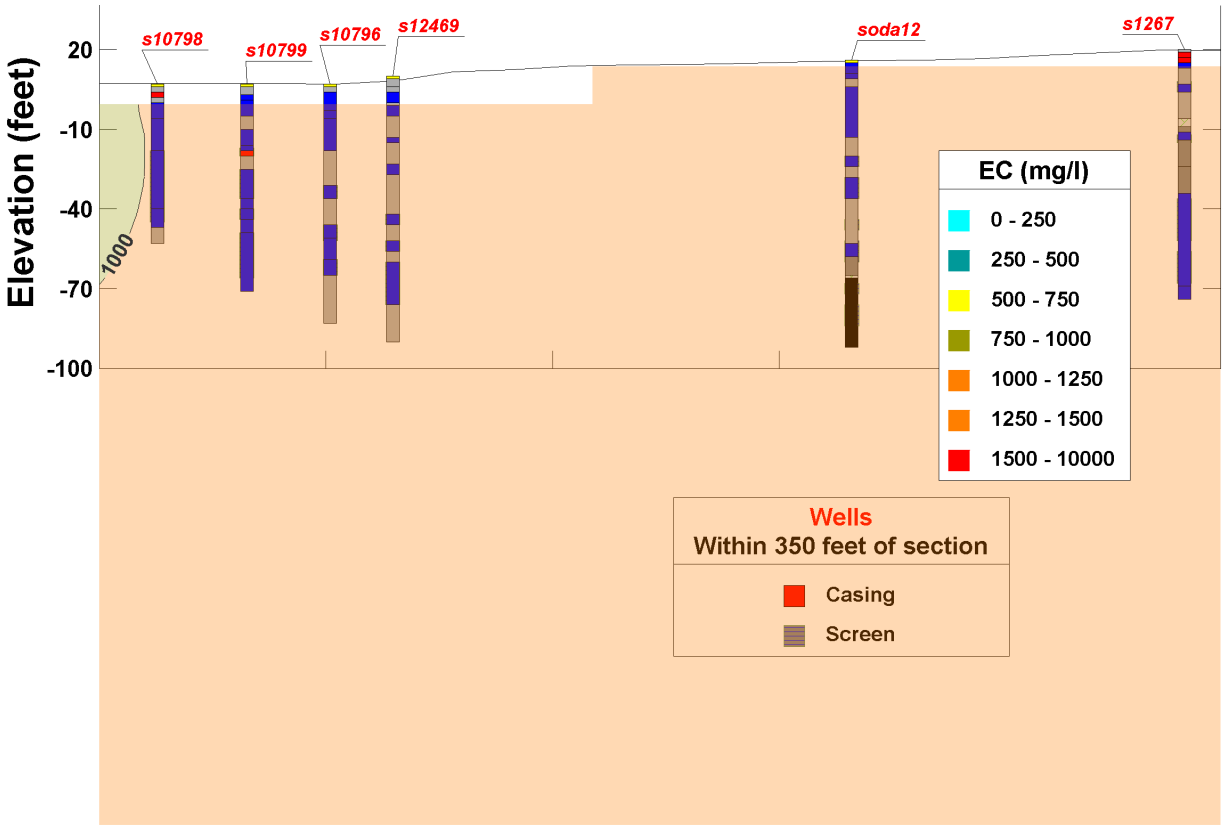

Figure 7: The change of EC in Profile (constructed with Environmental Insite)

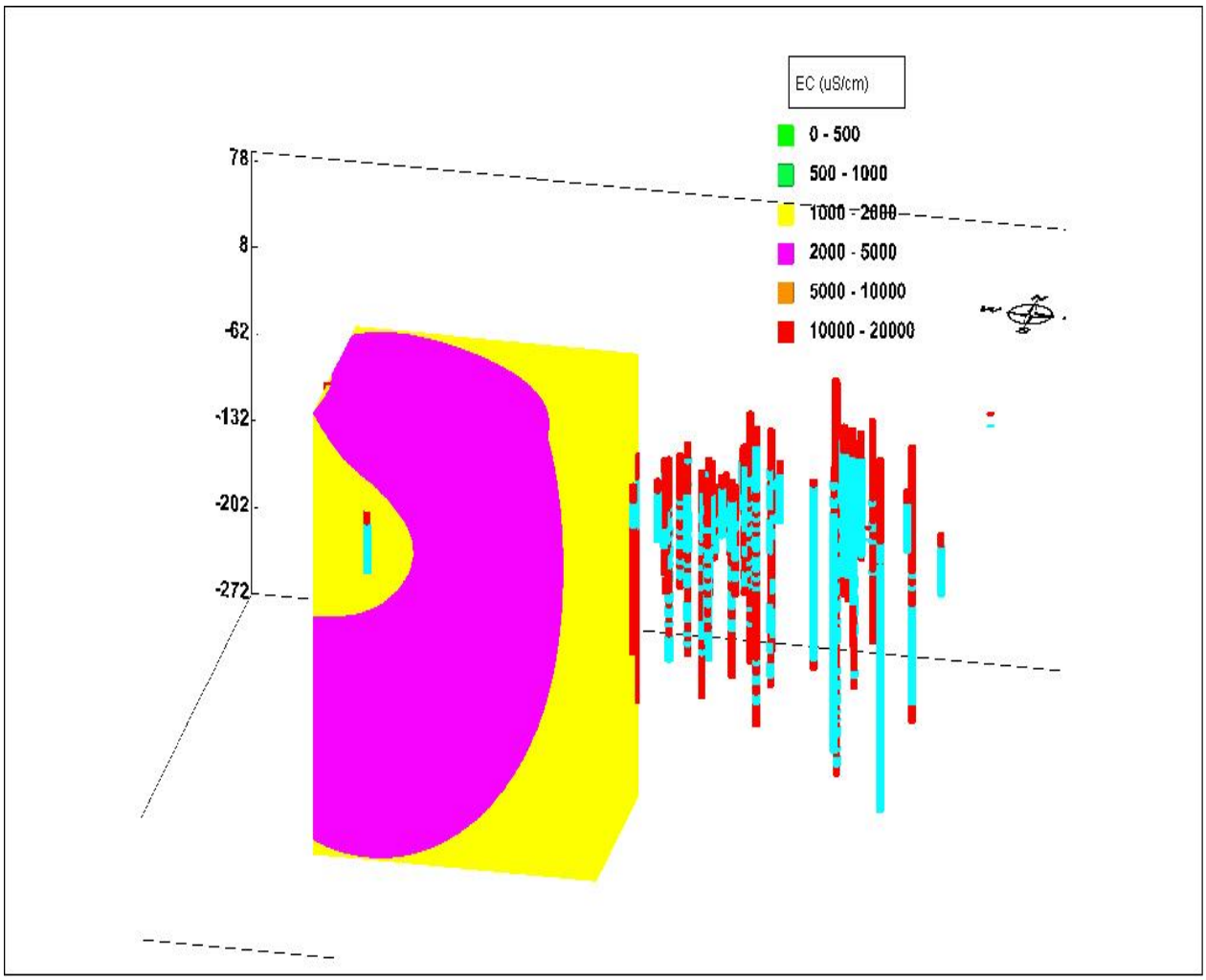

Figure 8: Electrical conductivity changing in 3D view (constructed with Environmental Insite)

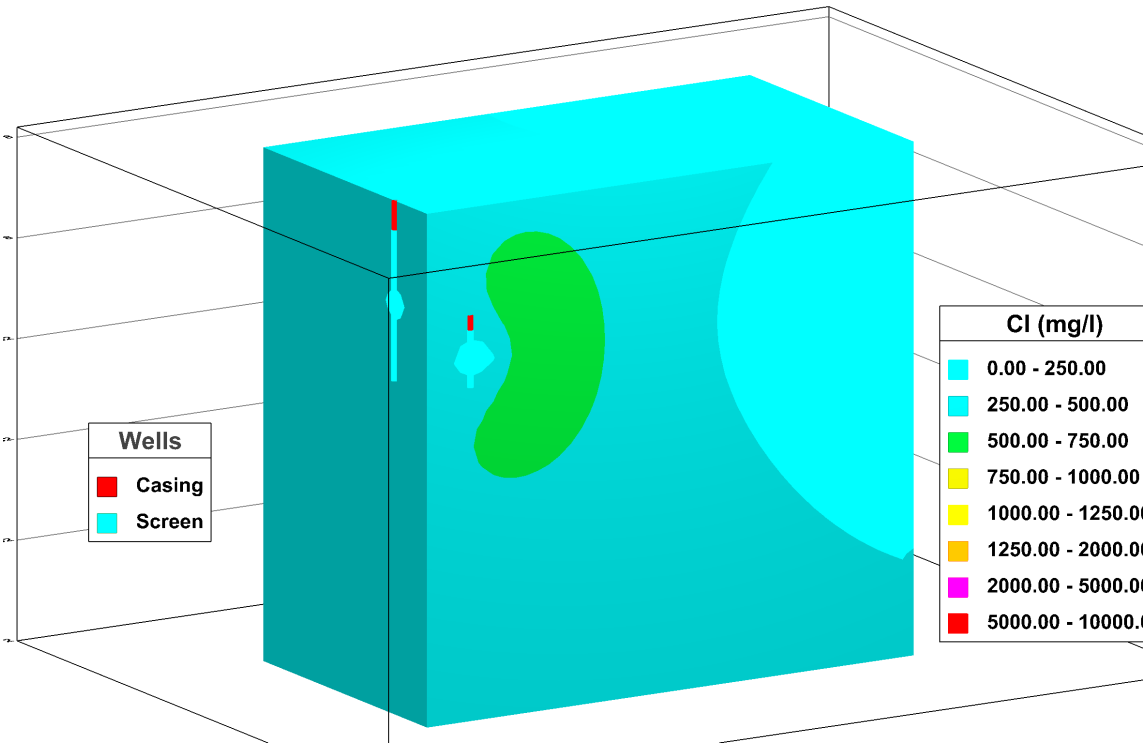

Figure 9: The change of Cl^- concentrations in 3D view (constructed with Environmental Insite)

The NH_3 concentration of groundwater is more than 0.4 mg/L around Mersin city center, Karaduvar and Kazanlı-Yakaköy towns (Table 1). This is an indication of recent pollution from anthropogenic sources. The PO^{3-}_4 concentration increases up to 2.79 mg/L near Mezitli and Kazanlı. This pollution is caused by agricultural land use. The F^- concentration in groundwater reaches to 12.5 mg/L locally. The highest concentration is determined in Karaduvar region. The sources of F^- ions in groundwater can not be geologic because there is not any fluoride or other F-minerals in the recharge area. So the source of F maybe Akgübre manure factory in Karaduvar. The thematic map of NO^-_3 concentrations indicates mainly three polluted area, Mersin City center, Mezitli and Kazanlı (Fig. 10).

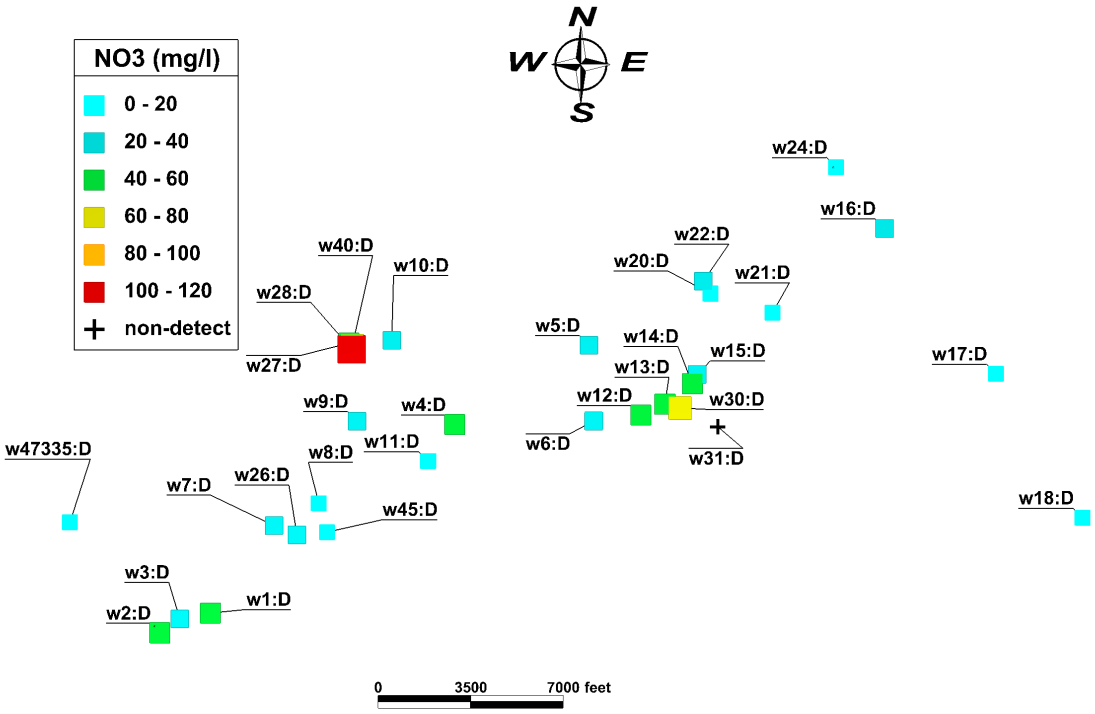

Figure 10: The variation of NO^{-}_{3} concentration in groundwater (constructed with Environmental Insite)

The Cu, Fe and Mn concentrations in groundwater increase near Kromsan and Soda factories in Kazanlı and Mersin City center. Also Fe concentration in this region is higher than EPA limit value of 0.3 mg/L (Fig. 11).

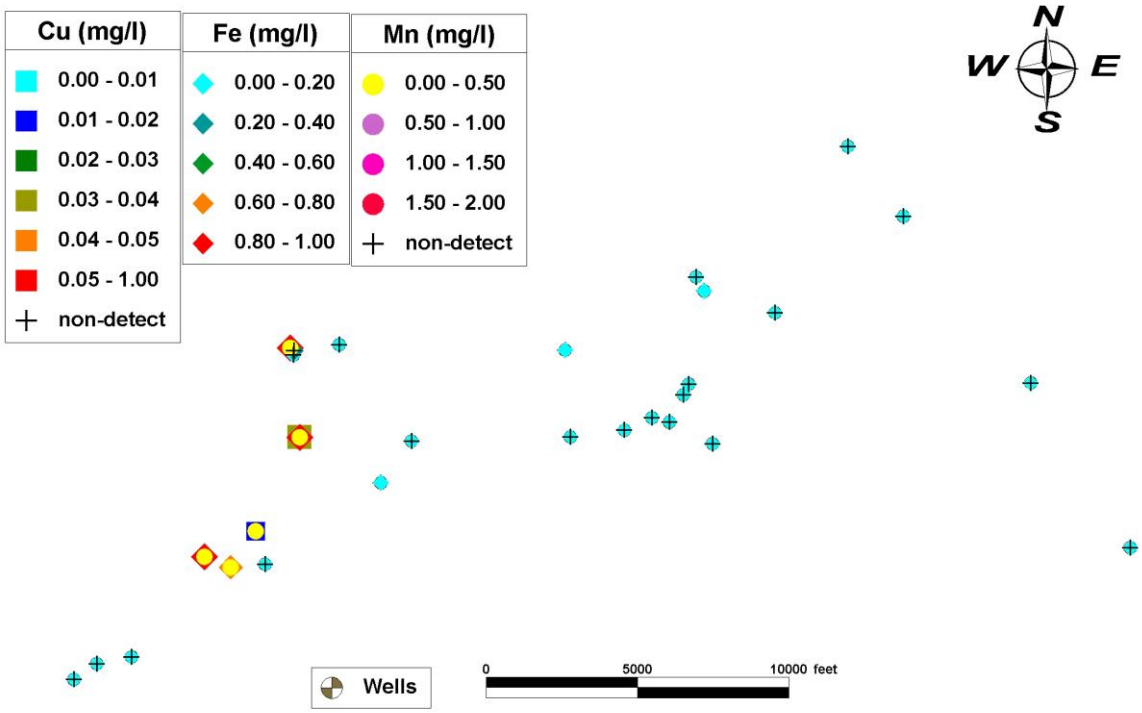

Figure 11: Heavy metal concentrations in groundwater (constructed with Environmental Insite)

CONCLUSIONS

The GIS is a method which allows to store, to evaluate and to interpret the different graphical and numerical data. This method is very useful for the evaluation of groundwater studies. For Mersin aquifer, a hydro geological GIS containing the digital geological map, the construction plans of wells and the result of quality parameters are created. The spatial characteristics of the groundwater quality are determined by thematic maps produced by Environmental Insite which shows the polluted areas. If the results of this study are taken into consideration for the future well plans, these new wells will produce good quality water.

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THE EUROPEAN HUMAN RIGHTS COURT AND ENVIRONMENTAL PROTECTION

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Currently neither the human rights conventions at the European level nor international covenants with regard to the classical as well as socio-economical rights cover any provision about environmental protection let alone to indicate a right to environment in spite of intensive efforts that have been going on since 1970's. This fact, however, does not mean that the mentioned conventions do not have any place on environmental protection. Therefore all related human rights bodies including the European Human Rights Court had opportunity to have opinion and judgments with regard to environmental protection during the interpretation of several Articles of the mentioned conventions under the cases related to some alleged violations of them.

This paper mainly addresses the approach of the European Human Rights Court toward the use of European Convention for the protection of Human Rights and Fundamental Freedoms to protect the environment. These kinds of judgments of the Court can be considered in two different bases such as either the acceptance of violations of individual rights under specific circumstances or refusal of them under some other situations. The core point is whether the Court has a tendency to remove from traditional human right concept or not to protect the environment.

Therefore the paper evaluates the classical human rights concept and the nature of the right to environment indicating main differences between them as well as the related main concepts and principles of environmental protection. As a concluding assessment it indicates that the Court is still far from being accepting an explicit right to environment as well as some radical principles of environmental law such as the precautionary principle. However it has judgments that can be used as a base to favor in a right to environment, and indicate the legitimacy of environmental protection as well as the importance of prevention and participation principles. Moreover some dissent opinion in some cases can be considered as promising statements for further protection of environment in the near future.

I. INTRODUCTION

Human rights conventions either regional or universal have of great importance since they constitute a fundamental basis for the inclusion of rights which they covered into constitutions as well as properly implementation and application of them in the practice at the national levels. Therefore the expansion of fundamental rights listed in these documents through the preparation of new protocols or the addition of new provisions to the present documents to include the new rights which are emerged as a response to the latest developments and needs in societies.

Hence one should not surprise that efforts toward the introduction of a right to environment or at least of a provision concerning the importance of environmental protection into the regional and universal human rights conventions or other documents as well as constitutions in national levels have a long history. It is true that the history of these kinds of claims which are put forward by environmentalists, scholars and institutions goes back to the perception of environmental problematic on the international agenda in the beginning of 1970s.

Unfortunately in spite of these continuous attempts presently neither the European Convention for the Protection of Human Rights and Fundamental Freedoms (the Convention) nor the International Covenant on Civil and Political Rights has any provision with regard to environmental protection let alone describing a right to environment implicitly or explicitly on the contrary of the positive developments at the national levels. Today provisions aiming protection of the environment are included into majority of the national constitutions even for the ones dated before 1970 through the amendments.

Consequently *interpretation* as a legal instrument has a significant priority since it contributes the continuous expansion of the list of the fundamental rights in the above mentioned conventions. If one looks at the history of the human rights he or she can clearly see that some rights which are not explicitly foreseen by the drafters of the mentioned conventions are created by judiciary as so called sub-rights through the interpretation. This trend can be observed in the light of the judgments of almost all human right bodies. Hence environmental protection as the latest global concern of humanity has not been far away from this development.

This paper will evaluate only the judgments of the European Human Rights Court (the Court). This Court currently can be cited as the most influential body under the established regime of the Convention. He indeed played a creative role in the face of situations not envisaged by the drafters of the Convention. This paper firstly will analyze his judgments concerning environmental protection n the context of two different categories, and than will assess these explanations in the light of the right to the environment and human rights concept before making concluding remarks.

II. ENVIRONMENTAL PROTECTION UNDER THE JURISPRUDENCE OF THE EUROPEAN HUMAN RIGHTS COURT

The Court's relevant jurisprudence would be analyzed in classifying them in two opposite categories according to the involvement of traditional human rights in environmental protection[[i]]. During this evaluation some crucial aspects as whether there are general criteria or some concepts to which referred by the Court in solving the conflicts between different interests would be touched.

The applicants of the relevant cases grounded on several Articles of the Convention. However the Court took into consideration mostly Article 8 of the Convention and Article 1 of the Protocol 1 to the Convention, and occasionally Article 2 of the Convention as a basis of his judgments. Therefore this paper will only emphasize the judgments with regard to the rights stated in these Articles which indeed are the right to respect for private and family life, Article 8 of the Convention (shortly the right to privacy); the right to property- Article 1of of the Protocol 1 to the Convention, and the right to life- Article 2 of the Convention.

The first paragraphs of these first two Articles encompass the right itself while the second paragraphs contain the legal basis to justify some restrictions on them. Therefore to truly understand the below judgments of the Court it needs to know what the Convention states in the all paragraphs of these Articles.

Article 8th of the Convention: *Right to respect for private and family life:*

"Everyone has the right to respect for private and family life, his home and his correspondence.

There shall be no interference by a public authority with the exercise of this right except such as *in accordance with law and is necessary in a democratic society in the interests of national security, public safety or the economic well-being of the country, for the prevention of disorder or crime, for the protection of health or morals, or for the protection of the rights and freedoms of others".*

Article 1 of the First Protocol: *"Protection of property":*

"*Every natural or legal person is entitled to the peaceful enjoyment of his possessions. No one shall be deprived of his possessions except in the public interest and subject to the conditions provided for by law and by the general principles of international law.*

The preceding provisions shall not however, in any way impair the right of a State to enforce such laws as it deems necessary to control the use of property in accordance with the general interest or to secure the payment of taxes or other contributions or penalties".

Article 2nd of the Convention: Right to life

"*Everyone's right to life shall be protected by law".*

In general States have obligations under the human rights and constitutional law to verify all their duties imposed on themselves by every paragraph of the mentioned articles. More clearly, on one hand they have to guarantee the individuals' rights protected by the Convention; on the other hand they have to ensure public interest as well. That means human rights can be restricted by States. However these should be done under the constitutional requirements and should only be exceptional. In this context one of the major justifications for such restrictions is the protection of the general interest.

Therefore the applicants' claims concerning violation grounded on the first paragraphs while the interferences of the defendant States based on the seconds.

A. Judgments Related to Interferences Based on the Protection of General Interest (Shortly "No Violation" Judgments): Conflicting Relations between Environmental and Individual Rights Protection

The core point in these category judgments is the subject as well as the aim and reason of the interferences by the defendant State in the applicants' rights. These interferences represent various ways with regard to the protection of the environment. States have interfered in individual rights since they considered that this is necessary to verify their duty on safeguarding of the environment as part of the general interest. Shortly, protection of the environment is the reason of the alleged interferences which are brought before the Court by the applicants on the base that they are violating their alleged rights.

Therefore the general interest represented in the activities of the defendant State concerning environmental protection and individual interest protected by the claimed rights is competing interests in this category. There is a conflicting relation between them.

1. The main examples of the interferences

These interferences which also indicate the relevant aim and reasons providing as a legal basis for the States' activities to protect the environment are as following:

-The rejection of planning permit for the construction of an industrial warehouse. Aim: Protection of "green-belt". Claim: Breach of the right to property. (*Pine Walley Developments Ltd and Others v. Ireland 1991*).

-Restricting of fishing with certain equipment, in certain areas and in certain times. Aim: Safeguarding of future fish stocks. Claim: Breach of the right to property. (*Posti and Rahko v. Finland 2002*)

-Denying a permit to keep the estate more than two years. Aim: Promoting of agriculture. Claim: Breach of the right to property. (*Hakansson & Sturesson v. Sweden 1990)*

-Denying an exploitation permit for gravel. Aim: Restoration of the relevant area. Claim**:** Breach of the right to property. (*Fredin v. Sweden 1991)*

-Refusal of planning permission to station a gypsy caravan and requiring the discontinuance of the unauthorized use, and caravans to be removed from where they stationed. Aim: Protection of the rural character of the relevant site. Protection of the countryside from all but essential development. Claim: Breach of the right to privacy. (*Coster v. the United Kingdom 2001; Buckley v. the United Kingdom 1995).*

-Refusal of a local permit to build a temple. Aim: To maintain a rational planning of land use. Claim: Breach of the right to freedom of thought, conscience and religion under Article 9 of the Convention. (*Vergos v. Greece 2004*).

2. The judgment of the Court

Although the applicants in the above mentioned cases complained also the breach of their some other rights protected under various Articles such as 9, 10, 11 of the Convention the Court evaluated these claims mostly under the right to property (Article 1 of Protocol 1 to the convention) and partly the right to privacy (Article 8). However In the last mentioned case he assessed the claim under the right o religion, Article 9 of the Convention. He justified the refusal of local permit to build a temple because of maintaining a rational planning of land use.

The Court weighed the competing interest in the cases as taken into account both the first and a second paragraphs of the mentioned Articles and found that there is not any breach in the applicants' alleged rights in these category judgments. Thus he ruled on behalf of the defendant States. It should be stressed that the court indeed accepted that there is interference in the applicants' rights. However after the weighing of competing interests he admitted that a fair balance has been struck and so the interferences are justifiable. Thus the justifying of the interferences in the rights under the Convention contributes to the protection of environment.

This fair balance indeed indicates that the general interest of the community prevails over the interest of individual [ii]. Consequently both the no violation judgment and, as its legal basis the second paragraphs of the claimed rights play an indirect role on protection of the environment.

Firstly the Court has assessed whether the alleged interference in the claimed rights is *lawful.* This means that these interferences should be in accordance with the internal law of the defendant State.

Secondly he searched for whether there is a *legitimate aim* meaning whether the defendant State pursued a public interest with the relevant interference in the claimed rights. In general, under the Court's jurisprudence public interest is considered as an extensive concept and States enjoys a wide margin of appreciation. Thus it should be respected unless it is without reasonable foundation [iii].

Thirdly the Court assessed the proportionality of the interferences in the claimed rights and tried to figure out whether the *margin of appreciation* exceeded by the defendant states. To do this he referred to the concept of *fair balance*.

He assessed whether the defendant States had maintain a reasonable proportionate between the means choosing for interference and legitimate aim of the interference; between the general interest of the community which is indeed the cause of alleged interference and the requirements of the protection of the applicants' claimed rights. Hence he tested the margin of appreciation of the States by taking into consideration the above mentioned *"relevant reasons*" of interferences and by referring to some sub concepts such as *the necessity in a democratic society* which is cited in the relevant Articles of the Convention.

The Court also referred to some more concrete evaluation techniques such as whether the restrictions caused a considerable decrease in the value of the property, and if there is such an increase whether it is compensated by the State or not. The core point of this assessment is finding out whether the applicant had to bear a disproportionate and excessive burden.

3. The reasoning in the judgment

After the above cited evaluation, the Court, when ruling in favor of defendant State and so rejecting the violation claims he justified the reasons of the interferences grounding, in general, on the argument that they are related to the environmental purposes in the public interest, and States have a wide margin of appreciation in the sphere of environmental protection.

The following terms which can be derived from the evaluation of these reasons by the Court in the above mentioned cases clearly reflects this remark:

-The protection of environment is an increasingly important consideration.[iv]

-There is a legitimate aim of protecting environment as part of general interest [v].

-The interference was designed and served to ensure that the relevant planning legislation correctly applied by the local governments [vi].

-Pursued the legitimate general interest of protecting the fish stocks [vii].

In these category cases, on the contrary of the second category cases, the Court allowed a wide *margin of appreciation* for States in determining the steps to be taken to ensure compliance with the Convention. He often indicated that in cases involving environmental issues for example planning cases States must be allowed a wide margin of appreciation. In this context he often declared that national authorities are in principle better placed than an international court to evaluate local needs and conditions of planning.

4. Achievements

Under the above mentioned jurisprudence, consequently, both the "no violation" judgment and, as its legal basis the concept of general interest has been played a particular role on the protection of the environment. Moreover this concept has been considered in a large extent covering various elements of the environment from the local planning of the land to the protection of green-belt and fish stocks.

B. Judgments Related to Interferences Derived From Environmental Degradation (Shortly "Violation" Judgments): Complementary Relations between Environmental and Human Rights Protection

The core point in this category is again the cause or subject of the interferences in alleged rights by the defendant States. But this time, as different from the previous category, these interferences are derived from various sources of environmental pollution, or if we put it in legal terms various *nuisances* grounded on noise or other pollution sources. More clearly adverse impacts caused from the operation of various industrial facilities have been the subjects of the relevant cases.

Therefore the Court's verdict on the existence of the violation of alleged individual rights through these kinds of interferences means that these activities or omissions (failure to act) of States are not justifiable under the Convention. Hence the protection of individual interests through the alleged right coincides with the general interest of the society (protection of the environment) since the elimination of the violation would be depend on the removal of environmental pollution–interferences-. Here is a complimentary relation between environmental protection and the applicants' rights ensured in the first paragraphs of both Articles 2 and 8.

1. The main examples of the environmental interferences
-Interference in the health and well-being of the applicants through the hazardous operation of some industrial facilities such as a waste treatment plant.(it is complained that the State did not took necessary steps to stop the harmful effects of the alleged plant to the applicant and her family-*Lopez Ostra v. Spain.1994), and* a chemical factory (it is complained that the State had failure to provide information about risk factors and how to proceed in the event of an accident at the nearby alleged facility-*Guerra and Others v. Italy 1998).*
-Interference in the health of the applicant through the night-time disturbances including noise caused *from* licensed premises such as nightclubs. It is claimed that the relevant local authorities had failure to take action to stop the noise which is beyond the permitted levels. (*Moreno Gomez v. Spain 2004*).
-Interference in the health and well-being of the applicant through the operation of a gold mine. It is complained that the government led the operation of the alleged mine which creates risks for the human health and environment on the contrary of the domestic administrative court's decisions. (*Taşkın v. Turkey. 2004).*
-Interference in the health and well-being of the applicant through the exposure to toxic chemicals during the tests concerning chemical weapons such as mustard and nerve gas. It is complained that the government had failure to provide information about the risks of the relevant tests (*Roche v. the United Kingdom 2005).*

-Interference in the health and well-being of the applicant through the toxic substances derived from a steel producing center. It is complained that the Government had failure to prevent the prolonged exposure to the hazardous emissions caused from the alleged center (*Fadeyeva v. Russia 2005).*
-Interference in the health and well-being of the applicant through the risk derived from a methane- gas explosion in a garbage tip. It is complained that defendant Stated has omission not informing the applicant of the potential dangers for himself and his family living in the vicinity of alleged area. (*Öneryıldız v. Turkey. 2004*).

Some other environmental nuisances such as exposure to the negative effects of nuclear power plants [viii], flood derived from a hydroelectric project also has been subject of some other cases and adopted by the Court as interferences in the claimed rights. However they justified on the ground of economic well-being of the country. In addition, noise pollution derived from airports is also considered by the Court as interference in the right to privacy and two related cases [ix] were concluded with friendly settlements while another one is concluded with no violation since the interference found justifiable [x]. An application *(Okyay others v. Turkey 2005)* about the failure of authorities to implement the domestic court's order to shut down three thermal power plants which pollutes the environment is considered as a breach of the right to a fair trial in Article 6 of the Convention.

2. The Judgment of the Court

The applicants in the cited cases claimed the breach of their various other rights under Articles 2, 3, 6, 10, and 13 of the Convention in addition to the right to life and right to respect to privacy. However majority of these cases are considered by the Court under the violation of right to privacy-Article 8 except the last one which is considered under the right to life-Article 2. Indeed this case (*Öneryıldız v. Turkey)* is the first and main example of consideration of the violation of the right to life for environmental interferences.

The Court in reaching his judgment again had *to weigh the general interest* represented in the interferences of the defendant State *and individuals' rights* protected under Article 8 and 2. By doing this he evaluated again *the margin of appreciation* of the defendant States and he referred to the same criteria mentioned above as legality, legitimate aim, proportionality and fair balance to assess it. At the end he reached the conclusion that there is not any breach in the applicants' alleged rights in these category judgments. Thus there is a ruling on behalf of the applicants, and interferences in the applicants' rights were not justified as contrary to the above mentioned first category.

However the Court took a more rigid or restrictive approach in assessing this discretion of the state when it is compared to his above judgments explained in the first category. Hence in this category the Court took more sensible and firm approach when evaluating the impact of interferences in the applicants' claimed rights. More clearly, he did not see the mere existence of the *relevant reasons* as enough and looked for whether they are *strictly necessary* to achieve the legitimate aims pursued by means of interference.

Thus he is gone beyond the *relevant reasons* put forward by the defendant State and challenged them on the basis whether they are *sufficient* or not. In this context he made it clear that if there are less grievous means other than applied one the pursued interference can not be regarded either as proportional or necessary in a democratic society. To put it more clearly there should not be any other means involving less severe threats to the applicants' claimed rights to be judged that there is no breach.

Therefore the Court, in ruling on behalf of the applicants, firstly grounded on the argument that defendant States did not struck a fair balance between the competing interests in the cited cases. He acknowledged that the alleged environmental pollutions adversely affected the applicants' right under both Articles 2 and 8 and prevented them to exercise their rights ensured by these Articles.

3. The reasoning in the judgment

The Court in ruling on behalf of the applicants, in general, grounded on the argument that the main reason pt forward by the States as the protection of economic well-being of the country can not be considered as justifiable under the first paragraphs of both Articles 2 and 8 of the Convention. He acknowledged that defendant States have failed to do their duties to ensure these rights of the applicants. Thus defendant States did not struck a fair balance between the competing interests in the cited cases.

4. Achievements

As regards to these category judgments two aspects are of great importance from the environmental protection perspective.

a. Positive duties: The Court clarified and enlarged the scope and content of the obligations imposed on States under Article 2 and 8 of the Convention in a certain extent. He admitted that the *negative duties* of States in classical sense, meaning refrain from violation are not enough to ensure the individuals' claimed rights. Thus he underlined that, in addition to these duties States also have *positive obligations* such as to take all appropriate and reasonable measures to prevent the risks to the right to life and the right to privacy. For instance in a case he cited that *"…administrative authorities had knew or ought to have known that he inhabitants of certain slum areas of Ümraniye were faced with a real or immediate risk both to their psychical integrity and their lives on account of deficiencies and cannot, moreover, be deemed to have done everything that could be reasonable be expected of them…"*.[xi]

To inform the applicants about the real and immediate risks with which they were faced through the environmental interferences is also considered among the duties of States. With regard to this obligation the Court stated in another case that *"State has not fulfilled the positive obligation to provide an effective and accessible procedure enabling the applicant to have access to all relevant appropriate information which would allow him to assess any risk to which he had been exposed during his participation in the tests"*.[xii]

Therefore it is true that the Court has gone beyond the traditional concept of negative duty as far as the classical rights are concerned. However he did this in a cautious way since, as he pointed out in *Öneryıldız v. Turkey*, he took into account only well-defined circumstances of the relevant cases, and did not admit that *every presumed threat* oblige the authorities to take concrete measures to avoid that risk.

b. Expansive interpretation: It is no doubt that the Court made a considerable contribution to the environmental protection due to his wider and teleological interpretation of the right to privacy under Article 8 of the Convention. He accepted a quite large scope for this right. It is worth to note his well-known statement in *Lopez Ostra v. Spain* in this context which is as *"Severe environmental pollution may affect individuals' well being and prevent them from enjoying their homes in a way as to affect their private and family life adversely, without however seriously endangering their health"*[xiii]. He considered the negative effects of various environmental pollutions on human health such as night time disturbances through the noise and light, and negative impacts derived from some industrial facilities under this right instead of the right to life. Allegations concerning failure of States to inform applicants about the potential risks also have been considered under the same right instead of the right of information ensured in Article 10 of the Convention. Right to sleep is understood as an essential part of the right to privacy. Even disturbances on the traditional way of life of indigenous people who lives side by side with natural goods as well as the gypsy way of life are considered as part of the mentioned right.

Consequently the right to privacy has been considered in the legal literature as basis for the protection of the environment and recognizance of an implicit right to live in a healthy environment.[xiv] Even it is suggested that the Court established *environmentalist jurisprudence* [xv]. However this consideration should be approached as cautiously.[xvi] It is too early to admit that the Court took an environmentalist approach. It can mostly be suggested that only *the right to live in a healthy environment*, not *the right to environment*, which does not challenge the traditional human right concept is indirectly established under Article 8.

III. EVALUATION OF THE COURT'S JUDGMENTS UNDER THE RIGHT TO ENVIRONMENT AND TRADITIONAL HUMAN RIGHTS CONCEPT.

This analysis will be made by answering two following interconnected questions.

1. Do the cited judgments of the Court provide a basis to protect the environment in general and thus provide a direct legal basis for the right to environment?

2. Do these judgments challenge the traditional concept of human rights?

The immediate answer to these two questions is "no".

The reasons of this reply would be explained in the light of considerations with regard to the right to environment.[xvii]

A. Specific Characteristics of the Right to Environment: Differences from the Traditional Human Rights

The formulation as *the right to the environment* indeed has a large meaning if one takes into account ecological facts and the aim toward *the protection of the environment as a whole*. Since the concept of ecosystem covers *all non living and living organisms including human beings* literally the term of the environment encompass all of these as its largest meaning. Hence the right to the environment covers the protection of all organisms including next generations. For that reason it has *collective* characteristics on the contrary of the *individualistic* nature of traditional human right [xviii].

This collective characteristic inevitably leads to another nature as the protection of the *general interest.* Because of these interrelated two characteristics there is not an *identifiable individual interest* as in the classical human rights concept.

For the same reason it has inconsistencies with the traditional human rights concepts since the principal aim of the human rights as well as law in general is *the protection of human beings. The other goods or organisms are only protected under classical law and human right concept through their affiliations* with human beings. Therefore only individuals are entitled to the human rights. This is indeed the consequences of traditional social perception that environmental goods other than human species have primarily instrumental value, meaning they exist only for human benefit, and do not have intrinsic worth in themselves. At the present stage of environmental protection *anthropocentric approach* is still dominant in the world mainly because of this fact.

On the other hand there is another fact based on practical ground that even if the rights are also granted to organisms other than human beings the *implementation and enforcement issues would be verified only by human beings.* Therefore it seems that it will not be wrong to have the view that the logical formulation should be as *the right to live in an appropriate environment* under the current concept of human right system. Indeed conscience of that some constitutions including Turkish Constitution have preferred the formulation of linking environmental protection with an established human right such as *"Everyone has entitled to live in a clean, (and/or sound, decent, balanced) environment".*

There is also another relevant fact independence from the discussions with regard to the terminology and formulation issues. The application of this right requires *duties* or obligations for all legal and natural persons as citizens and States. Therefore the crucial point is that how can the verification of these duties be ensured? This main point indicates another difference of the right to environment from traditional human rights. *This right entitles a right combined with obligations to its subjects***.** This point can be also considered as the reason behind a suggestion in the literature about the formulation *as right to environmental protection* [xix] which is indeed can be challenged on the fact that the term protection mainly encompasses the duties.

B. The Arguments for the Above Cited "No" Reply

Particularly the above analyzed first category, meaning violation judgments are considered in the light of the specific nature of the right to environment it can be easily seen that these judgments are far from reflect the specific nature of this right. [xx] It is obvious that *human being is primarily and directly protected subject* under these judgments. Thus environment is protected indirectly, through the protection of *individuals' interests* which are indeed considered only in the particular conditions concerning the relevant specific rights. Moreover the *immediate -short term interests* of individuals had been taken into account.

The court did not admit that environmental pollution or degradation either can be considered as a general interference of both Articles 2 and 8, or as the existence of a requirement with regard to the eliminating all environmental harms-risks. More clearly he did not take into consideration the protection of the environment in general. Instead, he repeatedly underlined *the connection of alleged environmental interferences with the applicants' individual interests (causal link)* in the cited cases. Thus the protection under the mentioned rights can not be applied to environmental degradation taken place in areas outside the individuals' private interests, and open for the use of everyone.

Additionally, he did not interpret this link under the mentioned rights in a large extent because he considered the existence of a *certain level adverse effect* of alleged interferences on the applicants' relevant rights. He stressed that *"adverse effects of environmental pollution must attain a certain minimum level*" and "*the assessment of that minimum depends on all the circumstances of the case such as the intensity and duration of the nuisance, its physical or mental effects".*[xxi] He underlined the need of a *clause link* between the alleged interferences and the applicants' rights. He pointed out the necessity of such a link as referring the terms as *reel, personal, immediate, serious, specific and imminent* danger or threat.

Therefore he dismissed several applications on the ground that *they are superficial, tenuous, remote, and hypothetical since they do not reflect such a connection.*[*xxii*] He emphasized these aspects in its various judgments which are not considered under the above mentioned categories since they are not of specific importance as far as their contribution to the environmental protection is concerned. For instance in two identical cases (*Balmer-Schafroth and Others v. Switzerland. 1997; Athasanooglou and Others v. Switzerland 2000*) which brought before him on the ground of threat to health caused by the operation of nuclear power plants the Court argued that the applicants failed to show that they are facing *a reel, personal and immediate risk* because of the operation of the alleged plant. Hence the Court dismissed any attempt of *actio popularis* concerning environmental risks in general.

Moreover the Court stated in another case (*Kyrtatos v. Greece 2003*) that *"the crucial element … is the existence of a harmful effect on a persons' private or family sphere and not simply the general deterioration of the environment. Neither Article 8 nor any of the other Articles of the convention are specifically designed to provide general protection of the environment as such;"*[[xxiii][(it needs to note that the allegation in this case is the visual and noise pollution as well as destruction of the swamp derived from the urban development).

As regards to the second category judgments, it is interesting that the legal literature did not pay the necessary attention to this aspect. However these judgments also are of considerable importance on the protection of the environment under the following theoretical aspects.

First off all, as it is explained above the essential point in this category judgment is the finding of justifiable of the relevant interferences in the rights and freedoms by States on the ground that they are representing general interest as protecting environment. Today, at least in theory, it is widely accepted that the protection of the environment is *general interest*, and this concept has a large meaning covering all human beings including next generations. In the short term there may be conflict between this interest and individual interests and their relevant fundamental rights. However in the long term this protection coincides with individuals' interests. Therefore there is a need also to consider the interests of individuals in the light of long term. In that case the conflicts in question in the short term could be handled under this fact.

Secondly *these judgments coincide with the real meaning and essence* of the right to environment when they compared to the first category judgments because the dimension of *duty-obligation* becomes priority in both theory and practice in any case regardless of formulation of the right to environment. **T**he specifying more duties would mean that individuals had to accept more restrictions in their several rights and freedoms such as the right to property and freedom of movement. Therefore the more justifiable of such restrictions under the general interest concept would lead the more environmental protection. Consequently an arising essential problem is to find the ways of an *adequate balance* between these competing interests.

IV. CONCLUDING REMARKS

The Court presently did not open a door to the general protection of the environment under the rights ensured by the convention. As he stated neither Article 8 nor any of other Articles of the Convention are specifically designed to provide the general protection of the environment. However, under his second category *judgments* he took certainly a positive step due to his expansive and dynamic interpretation of the right to privacy, and admitting that serious adverse affects of environmental pollution (or unhealthy environmental conditions) constitutes a breach of this right. This should be considered an achievement bearing in mind that that it depends on well defined circumstances of each case.

The Court's *judgments reflecting no violation* have also great importance for environmental protection in spite of the fact tat they did not receive necessary attention in literature. The following facts point out their importance as well as the role of the Court in the future:

Since the protection of the environment is *general interest,* and in the long term it is consistent with individuals' interests, individuals must consent more restrictions on their several rights in the short term on behalf of they long term interests to maintain the sustainability of life. The crucial point is to find a proper answer for the questions of in what extent and what kinds of restrictions, and on which rights? An evaluation concerning the answers of these questions should take into account three key points:

Firstly, the Convention must be regarded as *living instrument*, meaning it should be interpreted *in the light of present day conditions* which are indeed firmly rooted in the Court's case law. These conditions reflect the inevitable evolution of societies and their changing ethical values. There is no doubt that environmental protection is included in this instrument in the light of today's conditions. For instance individuals must consent more restrictions on their right to property on behalf of preventing environmental degradation.

Secondly, the *core of every rights and freedoms* should be clarified, and a cautious approach should be taken not interfering in this area.

Thirdly, these evaluations should be made by the Court in the light of *democratic society* as well as *rule of law*, and away from all established universal or national *political and economical pressures based on various private interests.* Otherwise some individuals' rights and freedoms can be sacrificed on behalf of some limited ideological purposes by using environmental protection as an excuse.

As a final word it should be noted that the increasing of *environmental consciousness* in societies would be a crucial determinant factor on the all steps to be taken on the above mentioned analysis. The increasing of serious negative effects of the environmental problematic will accelerate such a consciousness, and it would be inevitable for the Court to reflect these new developments in its judgments. Some dissenting opinions under analyzed jurisprudence already support this suggestion. Therefore **i**t is likely that new developments will force the Court the interpret the *causal link* between individuals' interest and the environmental issues more broadly taking into account the ecological facts like interdependent of all organisms and the long term interest of individuals.

Notes and references

See generally Churchill, R.R." Environmental Rights in Existing Human Rights Treaties", in Human Right Approaches to Environmental Protection.Boyle, A. , Anderson, H., Eds. Oxford University Press 1996, p.89-108; Jose, Daniel Garcia San. Environmental Protection and the European Convention on Human Rights. Conseil of Europe 2005; Mowbray, Alastair ."The Creativity of the European Court of Human Rights". Human Rights Law Review. 5:1 2005. p.57-79.

See Jose, Ibid,, p.58

See Zvolsky and Zvolska v. The Czech Republic 2002, paragraph 67.

Fredin w. Sweden

Coster v. The United Kingdom

Pine Walley Developments Ltd. and Others v. Ireland.

Posti and Rahko v. Finland.

Balmer-Schafroth and Others v. Switzerland 1997.

Arrondelle v. the United Kingdom; Bags v. the United Kingdom

Hatton and Others v. the United Kingdom 1998.

Öneryıldız v. Turkey, Paragraph 87.

Roche v. The United Kingdom. Paragraph 167.

Paraghraph[51 of the judgment.

See Marguenaud, Jean Pierre. "Droit de L'homme à L'environnement et Cour Européenne des Droits de L'homme", RJE no. special 2003. p.16-9; Wnisdoerffer, Yves. "La Jurisprudence de la Cour Européenne des Droit de L'homme et L'environnement". RJE 2(2003), p.215.

Yves Wnisdoerffer Ibid; Wnisdoerffer, Yves. "Convention Européenne des Droit de L'homme-Note", RJE 2(2004), p. 177.

For instance for a cautious approach see. Shelton, Dinah. "Human Rights and the Environment: Jurisprudence of Human Rights Bodies", Env. Pol. and Law 32/3-4 (2002).p166.

For the theoretical analysis and related debates on the right to environment see Turgut, Nükhet. Çevre Hukuku Karşılaştırmalı İnceleme, Yenilenmiş ikinci bası. Savaş Yayınevi. Ankara 2001, p. 131-69.

See. Weiss, E.B. "What Obligations Does Our Generation Owe to the Next? An Approach to Global Environmental Responsibility". American Journal of International Law.84- 1990.p.96.

For instance Kiss (Kiss, Alexander. "Definition et Nature Juridique d'un Droit de L'homme a L'environnement" in Environment and Droits De L'homme. Kromarek, P. Ed.UNESCO 1987, p. 25) and Nanda, Veb P. (International Environmental Law and Policy. Transnational Publishers. 1995. p.66) supported this view.

18 See Turgut, Nükhet."Çevre Hakkı: AİHM ve Bergama Davası" in Legal Hukuk Dergisi, 2006, p.1361-373.

Fadeyava v. Russia, paragraph 68, 69.(It should be noted that this actual interference criteria has not been interpreted by the Court in such a strict way under Article 6 of the Convention in Okyay and Others v. Tuırkey).

The Court underlined these terms in his several judgments as Balmer-Schafroth and others v. Switzerland. Athasanooglou and Others v. Switzerland; Kyrtatos v. Greece

Paragraph 52 of the judgment.

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ENVIRONMENTAL LAW AND FOREST LEGISLATION IN IRAN

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Iran has huge surface with five different forest ecosystems. It has diverse natural, economic and social conditions. All of 12 million hectares of Iran forest areas(7% of the land area) are national resources. This cover has a lot of ecological, economical, recreational, aesthetic, educational and research functions but its potential for timber production is limited. Just Caspian forest with an area of 1.9 million hectares has suitable potential for exploitation, but this ecosystem is unique and also vulnerable due to high slope, existence of rare and endangers fauna and flora species, unique forest stands and sensitive soil. Hence its protection is a must and forest legislation must provide rational use, conservation, rehabilitation, possible increases in productivity and protection. It will enhance economy, timber and other forest production, soil and water conservation, weather regulation and other benefits. Some fundamental changes occurred in the economic, social, political and environmental conditions of Iran in the recent decades and made it possible to improve forest and environment laws. The Iranian legislation system specially its parliament has adopted several legislative acts since 1967 that some main laws adopted in 1967,1969, 1970, 1974, 1975, 1979, 1982, 1988, 1992, 1996 and the most important, effective, complete, and near nature law adopted in 2003 that is a revolution in forest and environmental laws in Iran. The major influences on Iranian forest and environment legislation process was: convention of Stockholm in 1972, UNECE ICP forests monitoring program in Geneva in 1987,UN decree in 1987, OECD regulations and recommendations of Paris in 1990, earth summit convention of Rio de Janeiro in 1992, OSCE recommendations of Montreal in 1993, UNCSD IPF session in New York in 1995 and UN-FAO session declaration of Rome in 1995. The newest forest decree in Iran that adopted in 2003 is the main and most improved forest law in Iran in order to sustainable development. It is the plan for conservation of northern forests of the country that its strees is on forest conservation, protection and developing. It can help to make a balance between forestry and nature conservation. Its chapters including: classification of the duties in different level of northern forest management, administrative policies and measures for conserving the north forests, executive frameworks for rehabilitation and development of vegetation, optimized use of existing resources and amendment the executive and technical methods, monitoring and evaluating of management in the northern forests of Iran.

***Key words**: Forest Laws, Environment Laws, Legislation, Constitution, and Iran.*

Introduction:

Iran has huge surface with five different forest ecosystems (Hosseini, 1998). It has diverse natural, economic and social conditions. Iran characterized by various ecological conditions from tropical to alpine climate, zero to over than 5500 m elevation and various vegetation landscape from conifers to desert plants. There are significant climatic variations and differences particularly in forest regions of Iran. These conditions caused great diversity in species and various forest types in Iran (Jafari, 1997). All of 12 million hectares of Iran forest areas(7.5% of the land area) are national resources. This cover has a lot of ecological, economical, recreational, aesthetic, and educational and research functions but its potential for timber production is limited. Just Caspian forest with an area of 1.9 million hectares has suitable potential for exploitation; this forest area extends throughout the south coast of Caspian Sea in northern part of Iran with 700-2000mm annual rainfall. It has high growth capacity due to humid temperate climate and fertile soil.

Fig. 1 Vegetation map of Iran

These forests extends for 800km in length throughout three provinces of Mazandaran(Hosseini, 2003), Golestan and Guilan with species such as: *orientalis*", "*Quercus castaneifolia*", "*Carpinus betulus*", "*Zelkova carpinifolia*", "*Diospyros lotus*", "*Alnus subcordata*", "*Tilia begonifolia*", "*Taxus baccata Buxus hyrcanus Fraxinus excelsior Castanea sativa Sorbus torminalis Acer velutinum.* Some species of Caspian forests such as "*Populus caspica*", "*Gleditsia caspica*", "*Parrotia persica*" and "*Pterocaria fraxinifolia*" are alive fossils (Hosseini, 2003). When the Europe covered by ice, these forests were alive and at the end of frozen, plant species of Hyrcanian forests immigrated to Europe and these forests is mother of European forests(Hosseini, 2003).

Fertile soil, suitable precipitation and temperate climate cases that "*Fagus orientalis Quercus castaneifolia*", "*Alnus glotinosa*" and "*Aecr velotinum*" can reach 50 meter height and 3 meter diameter at breast height. The biomass in some areas of these forests can reach 2000 m3 per hectare. Some all of the world. Just Caspian forest has suitable potential for exploitation, but this ecosystem is unique and also vulnerable due to high slope, existence of rare and endangers fauna and flora species, unique forest stands and sensitive soil. Hence its protection is a must and forest legislation must provide rational use, conservation, rehabilitation, possible increases in productivity and protection. It will enhance economy, timber and other forest production, soil and water conservation, weather regulation and other benefits. Fig. 2- Show a landscape of Caspian forest.

Fig. 2- A landscape of Caspian Forest

The Changes in forest and environment legislation in Iran:

The last years have seen a rapid evolution leading to a revision of forest laws. The process of adapting legislation to new political, economic and social developments has gained considerable momentum (Schmithusen, 1999). Countries with new and amended laws range from Albania and Finland to Sweden and Ukraine, Thy include Denmark, France, Germany, Great Britain, Portugal and Spain(Schmithusen, 1999). Some major changes occurred in Iran in this period. Some fundamental changes occurred in the economic, social, political and environmental conditions of Iran in the recent decades and made it possible to improve forest and environment laws. The Iranian legislation system specially its parliament has adopted several legislative acts since 1967 that some main laws adopted in 1967,1969, 1970, 1974, 1975, 1979, 1982, 1988, 1992, 1996 and the most important, effective, complete, and near nature law adopted in 2003 that is a revolution in forest and environmental laws in Iran.

The major influences on Iranian forest and environment legislation process:
The major influences on Iranian forest and environment legislation process was:
convention of Stockholm in 1972, UNECE ICP forests monitoring program in Geneva in 1987, UN decree in 1987, OECD regulations and recommendations of Paris in 1990, earth summit convention of Rio de Janeiro in 1992, OSCE recommendations of Montreal in 1993, UNCSD IPF session in New York in 1995, UN-FAO session declaration of Rome in 1995.

The newest forest decree in Iran:
In 27/Aug/2003(according to propose number 105/22511-80/4108 of IRANIAN MANAGEMENT AND PLANNING ORGANIZATION (18/Mar/2001) and based on principle 138 of IRI constitutional law), council of ministers approved integrated plan for conservation of north forests of the country as mentioned below (forest conservation,

Chapter 1: Classification of the duties in different levels of North forest management:
Article 1: Dominion of duties and total chart of different levels of North forests management (Great policy making, coordination, supervision and executing the activities) is presented below:

Duty explanation	**Duty domain**	**Parallel duties**	**Executer organization or department**
1st level of Ruling affairs	Great Policy making affair and making coordination with government	-Proposing the procedures and great policy making for conservation, rehabilitation and developing the north forests of the country -Making the integrated coordination between different executive organizations -Policy making regarding to using the lands of national resources for different usages that will cause use change and decreasing the north forests area -Approving the environmental regulations, criterions and standards of North Natural Resource Management Designs	-MOJA (Forest, Rangelands and watershed organization) - Supreme Environment Council
2nd level of ruling affairs	Planning affair providing , allocating and supervision (Concentrated policy making)	-Determining some environmental regulations, criterions and standards for North Natural Resource Management Designs	DOE

Chapter 1: Cont.

		-Determining procedures and executive policies and planning the affairs in frameworks of regulation and approved environmental criterion -Determining, providing and approving the service explanation of Natural Resource Management Design in framework of approved environmental regulation and criterion -Representation of government about ownership rights concerning the site and the superstructure of natural forests, rangelands and groves -Determining and receiving the ownership taxes and profits that is approved by authorities from exploiters	MOJA
		-Supervision, monitoring and evaluating the steers, policies, procedures and executive measures	-DOE (Environmental supervision) -Forest, Rangeland and watershed Organization(Technical and executive supervision) -MPO

Chapter 2: Executive policies and measures for conserving the north forests of the country:

Article 2: MINISTRY OF JIHAD AGRICULTURE (Forest, Rangeland and watershed Organization) is charged to determine all national resource area of the country. This is necessary in order to speeding the recognition and determining the area of national resource lands and separating the legal exceptions of people during 2-year urgent plan in Northern provinces of the country. Then MINISTRY OF JIHAD AGRICULTURE must receive the related license (Document) in the name of government.
IRANIAN MANAGEMENT AND PLANNING ORGANIZATION is charged to predict and determine the necessary expenditure, as annual budget for the related executive organizations. Of course this prediction and determining must be conducted after specialty evaluations.

Article 3: MINISTRY OF JIHAD AGRICULTURE is charged to submit its proposals concerning the conservation and exploitation of north forests of the country to the Cabinet in order to pass the legal process. DEPARTMENT OF ENVIRONMENT must coordinate and cooperate with MINISTRY OF JIHAD AGRICULTURE. These proposals must be delivered at most 6 months after issuing this decree. These proposals will be used in order to reform and improve the regulations and laws concerning the conservation and exploitation of north forests.

Article 4: Head of judicial can make decision concerning the protest record of protesters and illegal exploiters of forest and establishment of some specific courts.

Article 5: In order to increase the possibility of using the conservational equipments and new methods for conserving the north forests of the country, MINISTRY OF JIHAD AGRICULTURE and DEPARTMENT OF ENVIRONMENT must conduct some activities by cooperation of Ministry of Interior. These activities which will be conducted by cooperation of people include: Using the Radio communication network (wireless) in north forests, forming the protection (guard) group, protecting the main roads and establishment of protection borders. After giving the needed designs and specialty evaluations, necessary measures and budgets will be provide by IRANIAN MANAGEMENT AND PLANNING ORGANIZATION.

Article 6: Decreasing and stopping the important destructive factors of north forests in below mentioned methods are obligatory:
1- Exiting the graziers and live stocks from north forests:
MINISTRY OF JIHAD AGRICULTURE (Forest, Rangeland and watershed Organization) is charged to exit remained live stocks in the north forests (3.7 million live stocks) and about 10565 graziers (Hamlets with less than 20 families). These activities must be conducted during an arranged duration (at most 6 years). In order to achieve the mentioned goals, MINISTRY OF JIHAD AGRICULTURE must review the present executing methods and determine new suitable frameworks by exchanging the views and experiences of experts and specialists of different parts. Governor Generals of different provinces must determine the necessary considerations in order to speed the execution of the activities, removing the obstacles and probable difficulties and necessity of cooperation and coordination between different executive
organizations.
2- Gradual decrease of permitted utilization based on ecological potential of natural forests by presenting wood usage replacement plan, facility making for import the wood and other economical mechanisms concerning the situation of the markets, controlling the wood smuggle and forest roads
3- Diminishing the un compatible and destructive constructional and developmental activities of forests of the country:
A) New exploration and exploitation of mines class 1 of article 3 of Mine Law (approved in 1998), coal and decorative stones in north forests which have a destruction area more than 4 hectares must be approved by Supreme Environment Council. New exploration and exploitation of mentioned mines with destructed area less than 4 hectares must be conducted according to agreement of general department of DEPARTMENT OF ENVIRONMENT of province.
B) Allocating the necessary budget for executing the new national developmental projects that cause changing the forest use and decreasing its area, will be according to conducting the environmental studies and confirming of DEPARTMENT OF ENVIRONMENT. Executing the provincial developmental projects must be according to receiving license (permit) from General department of DEPARTMENT OF ENVIRONMENT of province.

Article 7: In order to decrease the pressure of graziers and villages around the forest on forest resources and also for replacing the graziers fossilized fuels instead of fire wood, Iran Oil National Company is charged to cooperate with MINISTRY OF JIHAD AGRICULTURE (Forest, Rangeland and watershed organization) .These organizations must determine some stations for distributing the oil and gas . Also they must provide some facilities for residents of villages which have more than 20 families in order to use oil and gas with suitable cost, at most during 4 years. Central Bank of Islamic Republic of Iran is charged to provide necessary facilities for making bakeries that use fossilized fuel, oil selling units in villages with more than 20 families in the forest border area or inside the forest. Mentioned facilities will be determined and paid with financial support to the rate of 70% from budget and technical supports plan of MINISTRY OF JIHAD AGRICULTURE.

Article 8: Regarding to potential limitation of forest resources and in order to decrease the rate of wood use and smuggle in north forests, Ministry of Commerce is charged to remove the obstacles of import of the different types (species) of wood. Ministry of Industry and Mine, MINISTRY OF JIHAD AGRICULTURE and related organizations (such as plant protection organization)

Article 9: After notifying this decree, every license for constructing the wood and cellulose industries and factories which use north forests resources, must be issued according to frameworks of the regulations of DEPARTMENT OF ENVIRONMENT and Forest, Rangelands and watershed Organizations. Mentioned organizations are charged to declare the related regulations and rules during two months.

Article 10: In order to compensate the losses of forest projects executers and mine owners who face to some loss by these decree, related executive organizations must inform the rate of loss and its type to IRANIAN MANAGEMENT AND PLANNING ORGANIZATION. Then after conducting the necessary specialty evaluations, suitable frameworks will be discussed in Economy Council in order to compensate the loss.

Article 11: The goal is to conserve the genetic sources of plant and animal species of north forest. So it is necessary to predict the necessary facilities in order to equipping, completing and developing the area that are under management of DEPARTMENT OF ENVIRONMENT and Forest, Rangelands and Watershed Organization. This will be executed by related authorities based on the case in the Northern provinces of the country.

Chapter 3: Executive frameworks for rehabilitation and development of vegetation:

Article 12: Some parts of forest are destructed or changed to degraded forest. In order to rehabilitate the mentioned parts, MINISTRY OF JIHAD AGRICULTURE (Forest, Rangeland and Watershed Organization) is charged to recognize these areas at most 6 months after issuing the decree. Then by cooperation of people and Construction Besiege, forestation and forest rehabilitation must be executed at most during two 5-year plan.

Article 13: In order to develop the forest and wood-culture, MINISTRY OF JIHAD AGRICULTURE (Forest, Rangeland and Watershed Organization) is charged to execute encouragement policies and attract the people cooperation in order to develop and expand the forests and make the ecological balance in fertile area by doing below mentioned measures:
1) Forestation in up stream areas and areas which were forest before, but are changed and destructed now in different reasons
2) Using the results of useable researches on species which grow fast in ecological situation of different areas of the north, such as: species of Poplar, Palonia and Eucalyptus
3) Providing situations for executing the tree plantation in fertile area outside of the forest. Cooperation of nongovernmental part (especially owners of the industries) must be used in this case.
4) Executing some projects such as developing the tree planting and farm forest in fertile steep lands

Chapter 4: Optimized use of existing resources and amendment the executive and technical methods:
Article 14: Regarding to role of north forests in conserving the soil, water and biodiversity and also concerning the necessity of paying serious attention to these resources in planning the regional development, it is necessary that land use execute by priority of forest conservation and development in north forests of the country. So IRANIAN MANAGEMENT AND PLANNING ORGANIZATION is charged to cooperate with DEPARTMENT OF ENVIRONMENT and executive and research organizations. Also this organization must prepare and determine the detailed land use of northern watershed basins at most during 3 years.

Article 15: In order to qualitative and quantitative conservation of north forests and paying attention to conservation and improving the biodiversity and environmental activities, IRANIAN MANAGEMENT AND PLANNING ORGANIZATION (Technical affair and regulation and criterion determination unit) is charged to establish a committee by cooperation of representatives of below mentioned organizations. This committee must consider about reviewing the forestry projects explanation. This review must be conducted at most during 6 months after issuing this approval:
1- Forest, Rangeland and Watershed Organization
2- DEPARTMENT OF ENVIRONMENT
3- Two representatives from Natural Resource and Environment faculty of Tehran University
4- Forest and Rangeland Research Department

Article 16: In order to review and collecting the services explanation and executing
1- Suitable conservation and development of conservational and protective activities of forest ecosystems
2- Suitable conservation and development of biodiversity in forest ecosystems
3- Maintenance of forest ecosystem growth and development with stress on knowledge and observing the mutual relationship of ecological factors of Habitats
4- Paying attention to Economical and Social situation of north forests and observing graziers in executing the Forestry designs

5- Using all facilities of Forest Watershed basins by the goal of decreasing the existing permitted and non permitted utilization of north forest and providing the occupation that are compatible concerning the nature such as planning about Ecotourism, aquaculture, wooden natural industries

Note: Continuing the existing mineral activities in the north forests of the country is no objection until the end of validity of exploitation license.

Chapter 5: Monitoring and evaluating the executive measures in the north forests of the country:

Article 17: Below mentioned cases are necessary in executing the optimizing the duties of DEPARTMENT OF ENVIRONMENT and Forest, Rangelands and Watershed Organization:

1) DEPARTMENT OF ENVIRONMENT must prepare the necessary environmental standards concerning development, rehabilitation and exploitation of natural resource and submit them to Supreme Environment Council in order to be approved.

2) Forest, Rangelands and Watershed Organization must develop, rehabilitate and exploit of natural resource according to the framework of environmental standards which are approved by Supreme Environment Council. Then submit them to legal authorities in order to be approved, and finally must execute them.

3) EIA of executive projects in order to observing the environmental standards (Part 1 of this article) is considered as responsibility of DEPARTMENT OF ENVIRONMENT.

Article 18: In order to aware the qualitative and quantitative change process of north forest and recognizing the effects of executed measures on the situation of forests and the environment, determining the future policies in order to achieve the permanent management of the forest , executing the below mentioned activities is necessary:

1) Executing the qualitative and quantitative monitoring project of north forests:

MINISTRY OF JIHAD AGRICULTURE (Forest, Rangelands and Watershed Organization) is charged to prepare big maps in scale 1:25000 for north forests of the country every 5-year. In order to draw these maps, they can use aerial photos and satellite information. Occurred changes can be presented as map and statistics of forest density. Also every 10-year, the qualitative and quantitative changes of forest can be evaluated by land statistics. These changes may include the basal area, density of canopy cover, type, regeneration situation, biodiversity and mass mixing. Also we can use sample areas or evaluating stations based on ecological considerations include biological and physical factors, then the results will be presented as comparing statistic. So evaluating and determining the social and economical situation and its changes especially statistics of population and live stock is necessary during 5 and 10-year durations, by using the evaluations of Iran Statistic Center.

2)Establishment of Forest Information Bank:

MINISTRY OF JIHAD AGRICULTURE (Forest and Rangeland Organization) is responsible for establishing some mechanized information stations for north forests of the country which include all descriptive and spatial information of present situation of the forest. Then according to mentioned temporal durations in part 1 of this article and after reviewing executive designs, can make the saved information up date. Forest, Rangeland and Watershed Organization of the country is charged to deliver the collected data and information to the related executive organizations.

Discussion:

The newest forest decree in Iran that adopted in 2003 is the main and most improved forest law in Iran in order to sustainable development. It is the plan for conservation of northern forests of the country that its strees is on forest conservation, protection and developing. It can help to make a balance between forestry and nature conservation. Its chapters (including: classification of the duties in different level of northern forest management, administrative policies and measures for conserving the north forests, executive frameworks for rehabilitation and development of vegetation, optimized use of existing resources and amendment the executive and technical methods, monitoring and evaluating of management in the northern forests of Iran) covers all protection and management needs for forest resources in Iran.

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LIABILITY OF THE POLLUTER: CIVIL & CRIMINAL

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Today, developed and developing countries are struggling with environmental damage and deterioration which are mainly caused by human behaviors. It can be revealed that pollution turned into a tragedy rather than being a natural result of industrialization which created a change in the legal aspects of the environmental damage and deterioration. As a result, environmental law is started to be perceived in the law systems where the developed countries were the pioneering countries.

The first direct legal arrangements in Turkish Legal System have been covered by the 1982 Turkish Republic Constitution which is followed by the legislation of the Environmental Code in 1983. The purpose of this Code is to provide protection for the environment which is the shared asset of all living creatures, in accordance with the sustainable environment and sustainable development principles. The Environmental Code is applied to ensure the execution of the protection of human health and the environment against damage and deterioration, whether caused by polluters or other impacts.

Apart from the Environmental Code, the title *"Crimes Against Environment"* has been legislated in the 5237 numbered Turkish Criminal Code (TCC) under the chapter *"Crimes Against Society"*. In the article 181 of TCC the crime of polluting the environment with intent is regulated while the article 182 of TCC is regulated to cover the crime of polluting the environment with negligence.

In this paper, the civil liability of the polluter which is regulated in the article 28 of Environmental Code will be examined in the light of the definition of *"the polluter"* defined in the article 2 of Environmental Code. Besides, the criminal liability of the polluter will also be examined with respect to the articles 181 and 182 of TCC.

I. THE CIVIL LIABILITY OF THE POLLUTER

Environmental liability aims at making the causer of environmental damage (the polluter) pay for remedying the damage that he has caused. Environmental Code lays down norms and procedures aimed at preserving the environment. Without liability, failure to comply with existing norms and procedures may merely result in administrative or penal sanctions. However, since it takes place in the Code, potential polluters also face the prospect of having to pay for restoration or compensation of the damage they caused.[1]

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[1] White Paper on Environmental Liability, COM (2000) 66 final, Brussels 9.2.2000, p. 11.

It is thought that with the usage of civil liability in both national and international scope, the two important principles of the environmental protection will be given validity: ***"the polluter pays"*** and ***"prevention"***. Civil liability is considered to be one of the legal and financial tools of the polluter pays principle as it provides the payment to be undertaken by individuals who have responsibility in the deterioration of the environment.

If this principle is not applied to covering the costs of restoration of environmental damage, either the environment remains un-restored or the State, and ultimately the taxpayer, has to pay for it. Therefore, a first objective is making the polluter liable for the damage he has caused. If polluters need to pay for damage caused, they will cut back pollution up to the point where the marginal cost of abatement exceeds the compensation avoided. Thus, environmental liability results in prevention of damage and in internalization of environmental costs. Liability may also lead to the application of more precaution, resulting in avoidance of risk and damage, as well as it may encourage investment in research and development for improving knowledge and technologies.[2]

It is assumed that, due to the same reason, this tool will prevent people to behave in manners that will deteriorate the environment, and hence will play a role in the realization of the prevention principle. The deterrence provided by the possibility of being exposed to civil sanctions in the future, not only in the aspect of not polluting the environment but with regard to all individual behaviors, clearly carries an indirect and secondary characteristic[3].

At this point, to determine the bases for the civil liability of the polluter, it is important to concentrate on the above mentioned two principles. The main six principles of the environmental law are prevention, cooperation and coordination, integration, participation, precaution and the polluter pays[4]. All these principles of the environmental law are extremely related to each other. Although the 3rd article entitled *"Principles"* of the Environmental Code constitutes 10 sub-articles, it does not mention each of the above stated principles.

The polluter pays principle is one of the most primary and important principles of the environmental law. It is possible to interpret this principle as *"the polluter should be exposed to the cost of the pollution"*. With the amendment in the Environmental Code, in April 26 2006, the (g) sub-article of the 3rd article is regulated as follows:

"The expenditures undertaken to prevent, limit and eliminate the damage and the deterioration, and to improve the environment, are financed by the polluter or who causes the deterioration. The required expenditures undertaken by the public organizations and institutions, in cases that the polluter lacks to take the necessary measures to stop, eliminate or mitigate the pollution and the deterioration or that those measures are directly taken by the authorized bodies, according to the Code of Procedures for the Collection of Public Claims numbered 6183, are collected from the polluter himself."

[2] White Paper on Environmental Liability, p.12.

[3] Turgut, N. : Çevre Hukuku, Ankara 2001, p.534.

[4] Keleş, R. - Ertan, B. : Çevre Hukukuna Giriş, Ankara 2002, p. 157; Turgut, N., p.201.

The logic behind the **prevention principle** is the fact that, in all areas, it is much more expensive and troublesome to treat the problems after they occur than to prevent them before their occurrence. If the prevention principle could be made to work adequately efficient and effective, both the environmental assets would be protected without any harm and savings would be obtained. Although this principle is not directly regulated in the Environmental Code, it finds its legal basis with the statements *"prevention of pollution"* or *"prevention of pollution and deterioration"* that passes in many places in the Code.

The regulation in the 8th article of the Environmental Code entitled *"Prohibition on Pollution"* can be considered as a reflection of the prevention principle:

"Actions such as, directly or indirectly, diffusing, storing, transporting and sending away of all kinds of waste and scraps into recipient environment in a manner that is harmful to the environment, contradictory to the standards and methods determined by the related by-laws, are prohibited.

In cases of a potential pollution, related people are responsible to prevent the pollution; in cases that the pollution is already occurred the polluter is responsible from taking the necessary measures to stop, eliminate the impacts of or mitigate the pollution."

A. The Regulation of Liability

Before the regulation in the Environmental Code, there were two legal bases regarding the civil liability of the polluter. One of them is the **tort liability** which is the main principle of the Code of Obligations. Tort liability regulates the compensation of a given damage to someone with fault and contradictory to law. The dominant principle of Turkish liability law is the tort liability. The elements of the tort are behavior (action), damage, appropriate causality relation, fault and contradiction to law. For someone to be liable from polluting the environment, first it should be proved that he behaved with fault.

The other one is provisions arising from the **neighborhood law** which is regulated in the Civil Code. In the 737th article of the Civil Code entitled *"Neighbor Right"*, it is stated that *"Everybody is responsible from avoiding excessive behaviors that will affect neighbors adversely in using their rights arising from their real property and especially in undertaking business functions"*. In the article 730 of the same Code entitled *"The Liability of the Real Property Owner"*, it is regulated that if the real property owner uses his property right contradictory to the legal restrictions, the damaged parties can claim compensation of their loss from him.

However neither of these solutions is sufficiently appropriate to form a basis to the civil liability of the polluter due to reasons peculiar to themselves, since in most cases it would be very difficult to prove the polluter's fault. Besides, it is a well-known fact that it is possible to harm the environment without fault. Similarly, provisions in the Civil Code are also insufficient because they only aim at protecting neighbors from behaviors of each other. Additionally, in the resolution of the disputes, provisions of the special codes such as Construction Code, Code of National Parks etc. are referred if they are related with the subject.

All these problems are ended with the regulation of the provision in the article 28 of the Environmental Code entitled ***"Liability of the Polluter"***. Until the 2006 amendment, the article 28 was composed of two paragraphs as follows:

"The polluters and the people who give harm to the environment are responsible from the damage they caused without looking for a fault clause.

Indemnity responsibility of the polluter from the damage he caused is also reserved in accordance to the general provisions as well."

Then, with the amendment realized in April 26, 2006, the statement of *"The claims related with the compensation of damages given to the environment are subject to the prescription of five years from the date when the damaged party learns the damage and who is liable."* is included in the 28th article as a third paragraph.

According to the article 60 of the Code of Obligations, material and immaterial (moral) compensation claim is subject to the prescription of one year from the date when the damaged party learns the damage and who is liable; however, in either case it is subject to the prescription of 10 years from the date the event which caused the damage occurred. With the amendment realized in the Environmental Code, a single prescription time is determined and this time period is started from the date when the damaged party learns the damage and who is liable.

As a result, when compared to former case, the period of one year is extended and since the start of the time period is accepted to be the date when the damaged party learns the damage and who is liable, a more convenient condition is created than a straight 10 years time period. When the concurrent and long-term effects of environmental damage is considered, a better solution -excluding the discussion of whether a five years period is sufficient or not- is reached compared with the former case.

B. The Legal Characteristics of the Liability

The civil liability of the polluter is regulated in the article 28 of the Environmental Code as a type of **absolute (objective) liability** with the expression *"without looking for a fault clause"*. Absolute liability relies on the thinking that in principle the person who has caused the damage should compensate it and fault is not a main element of this liability. For the realization of this liability, it is necessary that there should be a causality relation with the event that caused the liability and the damage. Absolute liability is divided into two as the ***"ordinary causality liability"*** and ***"danger (risk, peril) liability"***.

The ordinary causality liability composes the lightest form of the absolute liability and lies in between tort liability and danger liability. The base for this liability is the lack of realizing the absolute care obligation. Because of this reason, in many types of ordinary causality liability, the liable can escape from the liability by proving that the damage would occur even if he had performed the required care. This type of causality liability is called causality liability with proof of faultlessness. However, in some causality liability types, there is no possibility of proof of faultlessness which is called aggravated causality liability. And the danger liability is based on the possibility that the danger which causes the damage is either frequently occurs or that it may cause a huge damage[5].

In light of the above arguments, it is possible to state that the liability of the polluter, even sometimes it can be regarded as the danger liability[6], is in fact an aggravated causality liability without proof of faultlessness.[7] As a matter of fact, in some cases it is possible that the enterprises and facilities that cause the pollution present an important pollution danger; in some other cases even though individuals who do not present an important pollution danger, are also subject to this liability, if they pollute the environment. However some authors argue that the liability of the polluter does not fit to any sub-branch of the absolute liability and it arises from the fact that the protection of the environment is vital for the society. [8]

C. Elements of The Liability

The elements of the civil liability of the polluter are the subject of the liability (polluter), event that causes the liability (pollution), damage and the causality relation.

1. Subject of The Liability (Polluter)

The subject of the civil liability which arise form the environmental pollution is the polluter. Polluter is defined in the 2nd article of the Environmental Code entitled *"Definitions"* as: *"**Polluter:** real person and legal entities that lead to environmental pollution, corruption of ecological balance and deterioration of the environment, directly or indirectly, during or after their activities"*. Hence, the individual who runs the business or operates the facilities which cause the environmental pollution or who leads the pollution by any activity, is liable from the resultant damage.

There is no doubt that the article 28 of the Environmental Code will be executed in case that the activities of public legal entities that are within the scope of the private law, lead to environmental pollution. However, it should be accepted that the article 28 shall be executed in case that public legal entities lead to environmental pollution while serving public services. The case that a privilege of environmental pollution is provided to the public legal entities does not match with the purpose of environmental protection.[9]

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[5] Eren, F. : Borçlar Hukuku Genel Hükümler, Volume I, İstanbul 1998, p. 466-467; Tandoğan, H. : Kusura Dayanmayan Sözleşme Dışı Sorumluluk Hukuku, Ankara 1981, p . 8.

[6] Kantar, E. : *"Çevre Hukukunda Sorumluluk Kavramı"*, İBD, İstanbul 1984/1-2-3, p. 34.

[7] Tandoğan, H. : *"Medeni Hukuk Açısından Çevre Kanunu"*, Çevre Kanunu'nun Uygulanması, Ankara 1987, p. 25; Çörtoğlu, S. : *"Çevrenin Kirletilmesinden Doğan Sorumlulukla Taşınmaz Mülkiyetinin Aşkın Kullanılmasından Doğan Sorumluluğun Karşılaştırılması",* YD, Ankara 1986/1-2, p. 81; Sirmen, L. : *"Çevre Kanunu'na Göre Çevrenin Kirletilmesinden Doğan Sorumluluk"*, ABD, Ankara 1990/1, p. 23.

[8] Oğuzman, K. - Öz, T. : Borçlar Hukuku Genel Hükümler, İstanbul 2000, p. 634.

[9] Oğuzman, K. - Öz, T. : Borçlar Hukuku Genel Hükümler, İstanbul 2000, p. 639.

2. Event That Causes The Liability (Pollution)

Environmental pollution is the main element and base of the civil liability of the polluter. Environmental pollution is defined in the 2nd article of the Environmental Code entitled *"Definitions"* as: *"**Environmental pollution:** any adverse impact on the environment that may threaten the health of living creatures, environmental assets and ecological balance"*. It is no doubt that this definition includes the smell, noise and waste (According to the 2nd article of Environmental Code, waste is defined as: *"**Waste:** any kind of material that is generated, discharged or released to the environment as a result of any activity) to that lead to adverse effects on air, water and land."*

This clause is not a contradiction to law clause, but an existence of pollution clause. As stated before, since the pollution is contradictory to the Environmental Code, when pollution is materialized, contradiction to law clause is also accepted to be realized. Thus, there is no need to investigate whether there exists any "contradiction to law" situation, if the existence of the pollution is proved. The environmental pollution can be caused by an active behavior as well as by passive behaviors such as not undertaking the necessary measures.

3. Damage

Individuals or objects should be damaged, implicitly or explicitly, by the adverse consequences of environmental pollution. The damage can be a material or an immaterial one. The damage should be proved by the damaged party. The damaged party can be an individual as well as public legal entity. If the polluter can be hold liable from the damage caused due to other reasons, the compensation claims from these liabilities can compete with the compensation claims in accordance to the article 28 of Environmental Code.

4. Causality Relation

For the liability of the polluter, there should be a causality relation between the polluting behavior or action and the damage. In other words, the damage should be a result of the action which had caused the pollution. In this liability, it is not possible for the polluter to defense through proof of faultlessness. However, the three conditions that are accepted to remove the liability as they cease the causality relation due to the general principles of the liability law, also removes the liability of the polluter. These three conditions are an unforeseen event, fault of the third party or the damaged party that removes the causality relation in favor of the polluter.

II. THE CRIMINAL LIABILITY OF THE POLLUTER

The **Environmental Criminal Law** is a very young sub-division which recently started to attract attentions. Examining the environmental problems and taking some piratical and effective measures with respect to the criminal law was the product of a long lasting struggle for the protection of the environment. It finds its reflection in the provisions regulated under the title *"Crimes Against the Environment"* in the Turkish Criminal Law numbered 5237, under the chapter *"Crimes Against Society"*. In addition, in the article 1 of the Turkish Criminal Code (TCC) entitled *"The Aim of the Criminal Code"*, *"Environmental Protection"* is also accepted among the aims of the Criminal Code.

The intervention of the criminal law to the scope of the environmental law is an unavoidable must with regard to national aspects as well as the integration process to the EU. The *"Council Framework Decision 2003/80/JHA of 27 January 2003 on The Protection of the Environment Through Criminal Law"* of the European Council, is important for Turkey with respect to the integration process to the EU. This Decision presumes the protection of fields that are under the scope of the criminal law by the criminal sanctions and making use of the deterrent characteristic of the criminal law.

Environmental crimes are regulated in the second chapter of the TCC under the third section entitled *"Crimes Against Society"*. In this case, the crimes against environment are accepted as crimes against society and hence the natural and urban environment is protected for the society.

Under the title *"Crimes Against the Environment"*, crimes of *"Polluting Environment with Wastes and Scraps with Intent"* (TCC 181/1), *"Bringing Wastes and Scraps into The Country Without Permission"* (TCC 181/2), *"Polluting The Environment with Negligence"* (TCC 182), *"Causing Noise"* (TCC 183) and *"Causing Construction Pollution"* (TCC 184) are regulated.

According to the article 344 of TCC, the articles of 181 and 182 that are regulated for the aim of environmental protection, shall take effect within two years following publication date of the Code.

A. The Crime of *"Polluting the Environment with Intent"* (TCC 181)

Article 181 entitled *"Polluting the Environment with Intent"* states that:

"(1) Whoever, contrary to the technical procedures which are set out in the related codes, releases the wastes and scraps to the land, water and air with intent in a manner that will harm the environment, shall be punished with imprisonment from six months to two years.

(2) Whoever, brings the wastes and scraps into the country without permission shall be punished with imprisonment from one year to three years.

(3) In case that the wastes and scraps carry permanent effects in land, water and air, the punishment that shall be executed in accordance with the above paragraphs will double.

(4) In case the actions defined in the first and second paragraphs are related with wastes and scraps which carry characteristics that may cause the occurrence of diseases whose treatments are difficult for animals and human, weakening of the reproduction ability, transformation of natural characteristics of animals or plants, shall be punished with imprisonment not less than five years and shall be fined up to thousand days.

(5) In case the actions related with the second, third and fourth paragraphs of this article are undertaken by legal entities, shall be sentenced to security treatments that are peculiar to themselves."

As can be understood from the title of the article, the mental element (Mens Rea) of the crime is intent.

In fact in the article, two different crime types are regulated. First of them is the crime *"Polluting The Environment with Wastes and Scraps with Intent"* which is regulated in the first paragraph, and the second one is the crime of *"Bringing Wastes and Scraps into The Country Without Permission"* which is regulated in the second paragraph.

1. Polluting the Environment with Wastes and Scraps with Intent

In the crime of polluting the environment with wastes and scraps with intent, the release of the wastes and scraps to land, water and air knowingly and willingly, constitutes the crime. In that case, the existence of the general intent is sufficient for the formation of the crime without a need to look for whether the act of the perpetrator carries the aim of environmental damage or not.

The material element of the related crime constitutes the release of the wastes and scraps to land, water or air in a manner that will harm the environment, contrary to the technical procedures that are determined by codes. In that case, the release of the wastes and scraps to land, water and air in accordance to the technical procedures determined by the related codes, will not constitute a crime.

By the expression, *"contrary to the technical procedures determined by codes and in a manner that will harm the environment"*, a bound actioned crime is created. There are also arguments supporting that it would be more appropriate to create a unbound (free) actioned crime by using the expression *"contrary to law" instead of the expression "contrary to the technical procedures determined by codes"*. [10]

Supporters of this view bases their arguments on the point that *"technical procedures which are not determined by the code can be contrary to the law"*. [11] However, at this point, the necessity of the evaluation of the subject within the framework of the *"legality of the crimes"* principle and hence the *"clarity of the crimes"* principle become clear. *"No crime and punishment without law"* principle, which is one of the major principles of the criminal law, is guaranteed by the article 38 of the Constitution and by international treaties. *"No crime and punishment without law"* principle underlines the necessity of the predetermination of which actions constitute a crime and the corresponding punishments by law in advance.[12]

[10] Ünver, Y.: *"Yeni Türk Ceza Kanununda Çevrenin Kirletilmesi Suçları"*, Güncel Hukuk, December 2005, N.24, p.52.

[11] Ünver,Y.,p. 52.

[12] Demirbaş,T.: *"Ceza Hukuku Genel Hükümler"*, İstanbul 2005, p.107.

Any regulation in this direction will create a contradiction with the article 38 and consequently the article 7 of the Constitution[13]. At this point, when the article 38 of the constitution is taken into account, it seems more appropriate to re-regulate the technical procedures which are generally regulated by by-laws, statues, and etc., instead of regulating in pre-proposed way. Actually, it would be more appropriate to legislate this matter by codes, rather than regulating by regulations. For supporting an active attitude of the legislator and providing an active working of the article in a shorter time period, it appears to be another alternative to include an expression such as *"the technical procedures stated in this article, shall be determined with the code that will be legislated until the date ……"*, to the law text.

Another point that deserves attention in the paragraph is the creation of a wide norm by referring to the related codes.[14] However, this situation shall be regarded within the scope of the *"special contradiction to law"* and hence shall be evaluated as the high-lightening of the personality of the criminal liability principle.[15]

2. Bringing Wastes and Scraps into The Country Without Permission

With respect to the mental element, a crime is created by the un-permitted entrance of wastes and scraps to the country, knowingly and willingly. In that case, the existence of the general intent is sufficient for the formation of the crime without a need to look for whether the act of the perpetrator carries the aim of environmental damage or not.

With respect to the material element, a crime is committed by the un-permitted entrance of the wastes and scraps to the country. A crime is committed with the entrance of wastes and scraps into the country without permission.

3. Matter of Aggravation

In TCC 181/3, the case that the wastes and scraps in the land, water or air carry a permanent characteristic is regulated to be a matter of aggravation of the crimes *"polluting the environment with wastes and scraps with intent"* and *"bringing wastes and scraps into the country without permission"*.

In the case that the actions defined in the first and second paragraphs of TCC 181/4, are related with wastes and scraps which carry characteristics that may cause the occurrence of diseases whose treatments are difficult for animals and human, weakening of the reproduction ability, transformation of natural characteristics of animals or plants, are regulated as a matter of aggravation. Here, the condition that the wastes and scraps which constitute the material element of the crime, are convenient for the occurrence of the determined harmful results will be sufficient, and the materialization of the harmful result will not be looked for. It is also claimed that the expressions *"diseases whose treatments are difficult"* and *"weakening of the reproduction ability"* stated in the paragraph are contrary to the clarity principle.[16]

[13] In accordance with the article 7 of the Constitution *"The legislative authority is the Turkish Grand National Assembly on behalf of the Turkish Nation. This authority can not be assigned."*

[14] Ünver,Y.,p. 52.

[15] Erman,B.: *" TCK Tasarısı'nda Çevre Suçları"*, HPD, Fall 2004, N.2, s.188.

[16] Ünver,Y.,p. 53.

4. Regulation on Legal Entities

In the Turkish positive law, the criminal liability of the legal entities and the fact that whether they can be the active subject of the crime or not is a doubtful case. In TCC 20/1, the personality of the criminal liability principle is regulated. Besides in TCC 20/2, it is legislated that criminal sanctions could not be applied to the legal entities, but security treatments could be referred for the actions that are clearly stated in the code. Additionally, in TCC 60/4, it is also underlined that the security treatments[17] could only be applied to the legal entities under the cases clearly stated in the code.

In TCC 181/3, the regulation of the subject of applying security treatments to legal entities are limited to the matter of aggravated cases of polluting the environment with wastes and scraps with intent and to the action of bringing the wastes and scraps into the country without permission as well as its matter of aggravated cases. In the crime *"polluting the environment with wastes and scraps with intent"* that is regulated in the first paragraph of article 181, the application of the security treatments to legal entities are not stated.

B. *"Polluting The Environment With Negligence"* (TCC 182)

The TCC 182, which regulates the crime of polluting the environment with negligence, is as follows:

"Polluting the environment with negligence

(1) Whoever, releases the wastes and scraps to the land, water and air with negligence, shall be fined. In case that the wastes and scraps carry permanent effects in land, water and air, the punishment that shall be executed is imprisonment from two months to one year.

(2) Whoever, releases the wastes and scraps which carry characteristics that may cause the occurrence of diseases whose treatments are difficult for animals and human, weakening of the reproduction ability, transformation of natural characteristics of animals or plants, shall be punished with imprisonment from one year to five years."

The mental element of polluting the environment with negligence crime is negligence. The scope and the elements of negligence liability will be determined by referring to the article 22 of TCC and the general principles related with negligence liability.

The material element of polluting the environment with negligence crime is to release of the wastes and scraps to the land, water or air in a manner that will harm the environment. The notion that first attracts attention in the article 182 of TCC is that, unlike TCC 181/1, it does not include an expression *"contrary to the technical procedures determined by the related codes"*. So the crime regulated in this article falls into the free (unbound) actioned crimes category. However, the fact that this expression is not included within the article text is interpreted as *"leaving a space for analogy and administrative regulatory actions through un-guaranteeing law security from the aspect of typical action element of the crime"*.[18]

[17] According to the article 60 of TCC, the security treatments that are peculiar to legal entities are limited with *"cancellation of the permission"* and *"seizure"*.

[18] Ünver,Y.: p. 53.

On the other hand, it is claimed that the regulation of polluting the environment with negligence in TCC 182, is conflicting with the provision of *"objective liability of the polluter"* stated in the article 28 of the Environmental Code.[19] However, as the civil liability and the criminal liability rely on different legal bases, it is not appropriate to compare them and to derive the conclusion that they are conflicting.

In the TCC 182/1, the case that the wastes and scraps cause permanent negative effects to the environment is regulated as a matter of aggravation of polluting the environment with negligence crime. And in TCC 182/2, the characteristics of the wastes and scraps are stated to be a matter of aggravation. According to the related provision, in the case of releasing *"wastes and scraps which carry characteristics that may cause the occurrence of diseases whose treatments are difficult for animals and human, weakening of the reproduction ability, transformation of natural characteristics of animals or plants"* to the environment, the crime is aggravated.

Finally, the article 182 of TCC does not include any regulations related with the application of security treatments to the legal entities. Hence, in accordance with TCC 60/4 which states that it is not possible to apply security treatments to legal entities unless explicitly notified otherwise, security treatments can not be applied to legal entities for the crime of polluting the environment with negligence as well.

[19] Keleş, R.: *"2005 yılının Çevre'mizde Bıraktığı İzler"*: Güncel Hukuk, January 2006, N. 25, p.23; Yaşamış, F.: *"Çevre Ceza Hukukunda Son Gelişmeler: Yeni Türk Ceza Kanunu ve Kabahatler Kanunu"*, TBBD, N.58, May-June, p.140.

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ENVIRONMENTAL RIGHT IN TURKISH CONSTITUTIONAL LAW

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The paper mentions environmental problem in the framework of The Turkish Constitution. Environmental right is regulated mainly in Article 56 in the third chapter headlined "Social and Economical Rights and Duties" in the second part headlined "Fundamental Rights and Freedoms" of the constitution. So the environmental right will be considered and discussed as a fundamental right and a social right. Protection of environment is regulated in the constitution both as a right and as an obligation for citizens. This will be emphasized with its results. Not the only article about environment is Article 56 in the Constitution. There are some articles about coasts, forests, lands etc. Some other articles about public interest will be considered in the context of environmental right. Of course, some codes and other regulations and decisions of The Turkish Constitutional Court concretizing the environmental right will be mentioned.

The attention having increased on environment from 1970's, also influenced law, so environmental protection and environmental right started to include in legitimate and constitutional regulations. However in Turkey, it owned/got a constitutional basis at first by article 56 headlined "Health Services and Conservation of the Environment" of the Constitution of 1982.

It's possible to talk about some benefits of being considered of environmental problem in constitutional level. The fact that the environmental problem has regulated in the Constitution of 1982 in spite of all deficiencies, provides a protection for harmful attempts of the legislature. On the other hand, environmental right is in the same level with other facts, so this is able to guide the preferences of the authorities of legislation, executive and judiciary. That the conventions and conflicts about environment is pointed out in the constitution, in other words on the top of normative hierarchy, also means an improvement in this topic. As for in the situation of conflict of rights, that the environmental right is situated in the same level with other rights, will provide a stronger legitimacy to limit those rights like especially property right in favor of environment. Unless the regulation of article 56 were exist, inferences about environmental protection and environmental right would become possible just by way of interpreting the articles regulating the principle "social state" in articles 2 and 5; the regulation in article 5 which clarifies that ensuring "*the welfare, peace, and happiness of the individual and society; to strive for the removal of political, social and economic obstacles which restrict the fundamental rights and freedoms of the individual in a manner incompatible with the principles of justice and of the social state governed by the rule of law; and to provide the conditions required for the development of the individual's material and spiritual existence*" is the fundamental aims and duties of the state; and also articles regulating right of health/medical care, right of life,

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protection of coasts and forests etc. If so, this would cause some harmful results on the system of protection of rights about environmental protection and environmental right, and/or on judicial review of the constitutionality of laws, and much more.

Article 56 is regulated in the third chapter headlined "Social and Economical Rights and Duties" in the second part headlined "Fundamental Rights and Freedoms". Consequently, first impression is that, environmental right is not evaluated in classical rights that obligate the state not to interfere. As expressed in the justification of article 56, environmental right is accepted as a social right:

*"*The importance of environmental protection and dimensions which it has obtained recent years, obligate the state to give individuals a social right on living in a healthy and balanced environment."

That the environmental right is taken place in the section where health/medical care, environment and housing topics are regulated, and that the article 56 regulates environment together with medical care can be criticized from the point of view on the attention on that problem. In fact, its possible to say that while legislating/making the Constitution with a commitment to classical separation on rights, it becomes a big difficulty to locate the rights which can be called as solidarity rights, collective rights or third generation rights. There is the same difficulty for many constitutions of different countries.

When it comes to the text of article 56, we can see that the environment topic is expressed in the first two paragraphs:

"Everyone has the right to live in a healthy, balanced environment.

It is the duty of the state and citizens to improve the natural environment, and to prevent environmental pollution."

Neither in the Constitution a definition can be found on what "environment" is, nor does the environmental code make an effort in this way. But it's possible to mention many advantages of that. As the approach to the environmental problem has become more important, the implicit got widened; approaches about mentioning environment totally, became widespread. This is an important development for not to restrict the practices on environmental right and environmental protection. In other words, otherwise the law enforcement authorities could be able to take refuge behind the present limits of each definition.

In the Article 4 of the Environmental Impact Assessment Regulation which published in the Official Gazette No: 25318 dated 16th December 2003, environment is defined as "*biological, physical, social, economical and cultural medium where vivo sustain relations and exist in mutual interaction whole life*." It's possible to assert that impression mentioned above destines the administration to make a definition. But still there is no preventive reason for legislature or Constitutional Court so as to undertake the environment topic more dimensional. As a matter of fact, in a decision of Constitutional Court, we come across/find following statements:

"The first sentence of the article, both grants living in a balanced and healthy environment as a right, and obligate the state to ensure such a life… The first sentence of Article 56 does not include an obligatory factor about formation and limit of the environment which must be realized that is specified the characteristic above."[20]

If we approach the text of the article, it's obviously provisioned in the first sentence that living in a healthy and balanced environment is a right; than in the second sentence It is the duty of the state and citizens to improve the natural environment, and to prevent environmental pollution. The formulation way impresses that healthy and balanced environment is perceived not on its own, but concerned with human being. Also in the justification of the article this becomes clear by saying *"It is duty of the state to ensure a life for citizens in mental and physical health."* From this aspect, it won't be false to note that an egocentric perspective is adopted in the sentence. So, to a large extent, the provision of The Constitution is frosty for suggestions such as "right for environment" or "right for environmental protection"[21]

Although the Article 56 is in the chapter named "Social and Economical Rights and Duties", we can notice that, in the traditional separating on rights, environmental right in the first sentence is regulated as a part of classical rights. When we notice the first sentence of Article 17 headlined "Personal Inviolability, Material and Spiritual Entity of the Individual": "*Everyone has the right to life and the right to protect and develop his material and spiritual entity*." We should give attention to the results of attribution to right to life in Article 56 and possibility of application on environmental problems in Article 17 regulating right to life in the part headlined "Fundamental Rights and Duties". As N. Turgut clarifies, "*A positive result of the connection between environmental right and right to life is that, the provision of Article 65 which can be applied to Article 56 as this article is in the third chapter headlined "Social and Economical Rights and Duties", can not be used as a reason and excuse by the state not to perform the duty on environmental protection."*[22] Secondly, it's also a positive result that this subject can not be regulated by statutory decrees dependent upon the connection between environmental right and right to life." In fact, it's provisioned in the first sentence of Article 91 that "*..the fundamental rights, individual rights and duties included in the First and Second Chapter of the Second Part of the Constitution and the political rights and duties listed in the Fourth Chapter, cannot be regulated by decrees having the force of law except during periods of martial law and states of emergency*."

[20] E: 1987/16, K: 1988/8, T: 19.04.1988, Official Gazette: 23.08.1988, No: 19908.
[21] See, Nükhet Turgut, *Çevre Hukuku*, 2nd Edition, Ankara, Savaş , 2001, p. 156-7.
[22] Turgut, Çevre Hukuku, p. 139-140. In Article 65 named "The Extent of Social and Economical Duties", provisions that: "The State shall fulfill its duties as laid down in the Constitution in the social and economic fields within the capacity of its financial resources, taking into consideration the priorities appropriate with the aims of these duties".

In the second sentence of Article 56, it is the duty of the state and citizens to improve the natural environment, and to prevent environmental pollution. That a healthy and balanced environment is both the object of the right and an obligation of citizens, provides the possibilities for them not to behave against environment and to oppose such actions. So one can say it's aimed to provide active participation of individuals. The fact that, it's regulated "to improve the natural environment" as an obligation as well, strengthens this conclusion. Although environmental right is characterized as a right that individuals can put forward against the state, this right can be violated not only by the state but also by third persons. It's possible to demand from the state to take preventive measures for environmental protection in that situation

Even if citizens don't exercise their rights effectively, state can not escape its own obligation. When each two sentences are evaluated together, the state is obligated both for interference obligation such as in classical rights and fulfillment obligation such as in the social rights. In addition to that, Article 65 could make a restrictive effect on the obligation of "improving environment" because of its economical dimension, but this Article does not have such influence for evasion from obligation of the state when the issue is environmental protection or prevention of environmental pollution.[23]

The text and justification of Article 56 mainly consider natural environment and environmental pollution concerned with human health. However, the matter of environmental right is considered with its various dimensions in both other provisions of the Constitution and decisions of Constitutional Court. For instance, in the second sentence of Article 43 headlined "Utilization of the Coasts" in the Constitution, it's said that *"In the utilization of sea coasts, lake shores or river banks, and of the coastal strip along the sea and lakes, public interest shall be taken into consideration with priority.*" So it makes clear that coasts can be the matter of environmental right. In addition, Article 46 mentions condemnations to protect coasts.

When The Constitutional Court is noticing the relationship between Article 56 and Article 43, clarifies that seas and lakes are included by balanced environment. In the decision below, in edition to these it gives attention right of equal entrance to nature which is one of important components of environmental law:

"Coasts are naturally attending of seas, lakes and rivers, so utilization on them would be possible in condition that coasts are open for everyone. In addition, it's talked about condemnation to protect of the third sentence of Article 46. Meanwhile, after provisioning that "Everyone has the right to live in a healthy, balanced environment", Article 56 sets a relationship between this provision and Article 43 by way of designating that it is the duty of the state and citizens to improve the natural environment, and to prevent environmental pollution. Because, it's definite that seas, lakes, coasts as their extensions and coastal strip completing coasts are all connected with a balanced environment. Furthermore, way of using the coastal strip is the biggest factor in pollution of public coasts, seas, lakes and rivers.[24]

[23] İbrahim Kaboğlu, *Çevre Hakkı*, İstanbul, İletişim , 1992, p. 31.
[24] E: 1990/23, K: 1991/29, 18.09.1991, Official Gazette: 23.01.1992, No: 21120.

In the first sentence of Article 44 which determines land ownership in the Constitution, it's provisioned that "*the state shall take the necessary measures to maintain and develop efficient land cultivation, to prevent its loss through erosion*". As for Article 45, "*the state facilitates farmers and livestock breeders in acquiring machinery, equipment and other inputs in order to prevent improper use and destruction of agricultural land, meadows and pastures and to increase crop and livestock production in accordance with the principles of agricultural planning."* Afterwards in Article 169 it's provisioned that the state shall enact the necessary legislation and take the measures necessary for the protection of forests and the extension of their areas. It also clarifies that acts and actions which might damage forests shall not be permitted. Then Article 170 mentions collaboration with inhabitants of forest villages for protection of forests.

The Constitution explains that the state shall take measures to meet the need for housing within the framework of a plan which takes into account the characteristics of cities and environmental conditions, in Article 57 which determined right to housing. With regard to decisions of The Constitutional Court, urban environment is included by the "healthy and balanced environment" concept:

"There is no doubt that the healthy and balanced environment concept includes protection of natural beauty, a prevented water and air pollution that urbanization and industrialization bring about. But it also includes an arranged environment suited to a specific plan and program."[25]

Again, regarding to The Constitutional Court:
"The main aim of ground plan is to attain the best ways for solution among various urban functions in measurements of existing or possible feasibility; to cause the physical environment to succeed in getting a well-planned structure; to direct selections for locations and development tendencies and to designate the using-protection balance measurably; to provide people in town a good and civilized life order and conditions. Points about own life style and characteristics of the city, relations among population, field and structure; connections of the district with its environment and among different fields; social and cultural necessities, security and health of people is noticed during these works."[26]

Lastly, according to Article 63, "*The state shall ensure the conservation of the historical, cultural and natural assets and wealth, and shall take supportive and promotive measures towards that end.*" The Constitutional Court, while evaluating an article about future ground plans for The Bosporus, has determined that Articles 43, 56 and 63 of The Constitution should be taken into consideration and they has mentioned the connection between the environment concept and conservation of the historical, cultural and natural assets.[27]

Both articles which are program/guiding norm for state in point of law and decisions of The Constitutional Court, provide enlarging possibility for factors of environment concept in Article 56 and environment matter as well. In parallel, according to the Environmental Code, environment is "biological, physical, social, economical and cultural medium where vivo sustain relationships and exist in mutual interaction whole life."

[25] E: 1985/11, K: 1989/29, 11.12.1986, Official Gazette: 18.04.1987, No: 19435.
[26] E: 1990/10, K: 1990/14, 21.06.1990, Official Gazette: 04.02.1991, No: 20776.
[27] E: 1985/11, K: 1986/29, 11.12.1986, Official Gazette: 18.04.1987, No: 19435.

The first sentence of Article 56 refers to the subject of the right by way of determining that everyone has the right to live in a healthy, balanced environment. "Everyone" concept covers both individuals and social groups. In the Article 1 of The Environmental Code before it was changed by Law No: 5491, next generations had been emphasized. So, next generations as well, were subject of the right. According to us, although the "next generation" phrase was removed from the article text, they still will be the subject of that right. Because, as Kaboğlu specifies, "*environmental right becomes clear with the view of solidarity between people in times and places*."[28] Article 1 of Environmental Code features environment as collective asset. If so, not only individuals' efforts but also efforts of associations, states and communities are necessary for environmental protection. Because environmental right is a solidarity right. So, there are interests of both today's generations and next generations and interests of both individuals and public on environment. Now we can dwell upon some results of that, concerning protection of environmental right.

It's necessary that individuals, communities and states in the widest framework should have an opportunity for the applications in the direction of environmental protection, by way of departing from the classical understanding of the relation between damage and victim. Article 30 of Environmental Code is written out in that approach: "*Everyone who is damaged or informed about an activity polluting or unbalancing the environment, is permitted to demand taking measures or stoppage of the activity with recourse to the relevant authorities."* Council of State determinates that, in the matter of public interest such as conservation of the natural, historical and cultural assets and development and construction of public facilities, capacity to sue should be determined with a broad interpretation, in the annulment actions.[29] According to this approach, organizations such as environmental protection associations, professional institutions can bring an annulment action. Since everybody can apply to the administration according to Article 30, we should accept that every applicant can bring annulment actions in case of rejection of their demand. This, requires a different interpretation for "conflict of interest", one of preconditions of annulment actions.

That the individuals and the state are indebted about environmental protection and improvement requires collaboration between citizens and state and among citizens themselves for widening of environmental right. Provisions oriented such collaboration can be found in the 3rd sentence of Article 56 and in Article 170 about conservancy of forests. We come across that provision in the (b) paragraph of Article 3 of Environmental Code: "Ministry and local administrations, and if necessary trade associations, unions and non-governmental organizations play along with each other; in all sorts of environmental protection, prevention of unbalancing of environment and correction of pollution."

We have determined above that the regulation in Article 56 of The Constitution is predicated on an active participation of citizens. This matter is regulated in (e) paragraph of Article 3 of Environmental Code: "*Right to participate is the principle. Ministry and local administrations, is obligated to create a participation medium which trade associations, unions and non-governmental organizations and citizens can exercise environmental right."*

[28] Kaboğlu, *Çevre Hakkı*, p. 39.
[29] Council of State 10th Section, E: 2002/180, K: 2005/3958, T: 05.07.2005.

We can get some results from the provisions of The Constitution and the code: Firstly, it's wrong to think that the participation will be provided by the state or institutions the state orients. Mainly, it's necessary to get rid of obstacles against freedom of expression, science and arts, claim rights and the press, in edition, to widen freedom of association, right to hold meetings and demonstration marches. When the exercises of those rights and freedoms related with environmental right, are restricted owing to public interest and public order it shouldn't be forgotten that there is public interest on environment, and environmental public order is a dimension of public order.

Secondly, creation of participation medium requires reaching information and documents. It is the condition of participation to share information about all sorts of project and activity which is possible to effect environment. As described above, exercising information right related to environmental right requires exceeding boundaries of classical victim and interest concepts. So, about plans and projects possible to effect environment, individuals and groups should be able not only to exercise those rights in measurements of their direct interest, but also to demand entrance general information and documents in matters they are not directly effected. According to us, Article 74 makes it possible: "Citizens and foreigners resident considering the principle of reciprocity have the right to apply in writing to the competent authorities and to the Turkish Grand National Assembly with regard to the requests and complaints concerning themselves or the public*". The first sentence of Article 30 in Environmental Code regulates it more clearly:* "Everyone has right to reach information about environment in scope of Receiving Information Code*." However, in Receiving Information Code, it's possible to restrict to receive this kind of documents by applying to commercial secret, economical interests of the country or secrets of the state. Information right is clearly related to democracy problem of Turkey. According to Article 12 and addendum Article 7 of Environmental Code, interested parties are obligated to give information and documents to ministry and other competent authorities. It's clearly important to share collected information in context of providing participation to environmental problems.*

The normative value of Environmental Code causes that those who violate the right meet legal, criminal and administrative sanctions. For protection of environmental right needs freedom to claim rights and application right. According to Article 40 of The Constitution: "*Everyone whose constitutional rights and freedoms have been violated has the right to request prompt access to the competent authorities*." In addition, Article 36 of The Constitution is named "Freedom to Claim Rights": "*Everyone has the right of litigation either as plaintiff or defendant and the right to a fair trial before the courts through lawful means and procedures.*" It's possible to say that, Article 74 about right of petition and Article 125 clarifying that recourse to judicial review shall be available against all actions and acts of administration are also constitutional foundations of application right.

In Environmental Code, only administrative application is regulated. According to Article 30, "*Everyone who is damaged or informed about an activity polluting or unbalancing the environment, is permitted to demand taking measures or stoppage of the activity with recourse to the relevant authorities*." But judicial applications must be done with respect to general provisions.

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If we describe the environment as a collective asset and if we appropriate environmental interests as collective interest of humanity, we should mention the role of international regulations about environmental right and procedural rights on environmental right, in Turkish Constitutional Law. According to Article 90 of The Constitution, "*International agreements duly put into effect bear the force of law. No appeal to the Constitutional Court shall be made with regard to these agreements, on the grounds that they are unconstitutional. In the case of a conflict between international agreements in the area of fundamental rights and freedoms duly put into effect and the domestic laws due to differences in provisions on the same matter, the provisions of international agreements shall prevail."* We can see here that, in normative hierarchy, the provisions of international agreements are preferred to national laws in the area of fundamental rights and freedoms that The constitution regulates with the same name in Part Two. Furthermore, international agreements about some other provisions that The Constitution regulates outside Part Two named "Fundamental Rights and Duties", should be appraised in the same way. Article 2 regulating the characteristics of the republic, Article 5 regulating fundamental aims and duties of the state and Article 10 regulating equality before the law can be examples in that topic. If the international agreements about environmental right and procedural rights on environmental right are appraised in this framework, this will have an important role to get rid of defects of our positive law and for protection of rights. In the trials about environmental right, European Court of Human Rights takes the regulations into consideration, made by some organizations such as Council of Europe, European Union, United Nations, Security and Co-operation in Europe. It means that, not only international agreements but also other regulations are important for our legal system.

WHY DO WE CARE? ETHICS AND HONESTY ABOUT ENVIRONMENTAL ISSUES

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I am going to look at the ethical implications of the words in the title of this conference, *The Environment: Survival and Sustainability*. Each word in this title begs a question. Environment: Which environment? Physical, natural, cultural, historical, or built environment? Survival: Whose survival? Humans, animals, nature, the planet, (and maybe the universe)? Sustainability: Of what? Life (whose life?), resources (for how long?) ? And, of course, the general question: Why do we care? This last question makes us think about the meaning and value of environment and forces us to rearrange our priorities. For it is one thing to think of the environment as having an instrumental value, and quite another to think of it as having an intrinsic value. Normative concepts of the environment range from utilitarian concerns to idealist approaches, but they mostly derive from an anthropocentric understanding of the environment and only rarely from a planetary consciousness. The second part of the paper will concentrate on the role of literature in creating and sustaining an ethical consciousness and an honest environmental awareness. This part will be illustrated by extracts from relevant literary works.

Let us begin with what we really mean by 'the environment'. As Evelyn Shirk rightly points out, we live in many different types of environment: natural, cultural, political, economic, psychic, historical and built environment. "Apparently THE environment identifies our so-called 'physical' surroundings as more fundamental and basic than any of the others. . . The physical environment, which consists of bodies, forces and processes, is what used to be called 'Nature', as distinct from human nature." (78-79). However, this was not always so. In the early animistic traditions and far eastern thought, the distinction between the human and non-human worlds is not so clear cut. Man is seen as an integral part of this environment, and it is considered an extension of himself. The separation of the world from human beings is the equivalent of the cutting of the umbilical cord, which tied them to the source and fountain of their being. This severance seems to have enabled man to see himself sometimes as a custodian, but mostly as the master of this physical world. In this post-lapsarian view, Nature is the other of man, external to his being; but it is there to be contemplated, enjoyed and is believed to have been created largely for the good and benefit of man. This comforting view of Nature began to change in the twentieth century as environmentally hazardous products threatened to poison it. Today, in many parts of the world, it is dangerous to swim in the seas, to bask in the sun, eat agricultural products, meat, fish and poultry, or even breathe. We talk of pollution, contamination, the growing hole in the ozone layer, and many other environmental evils. Nature, which used to be our friend, has become our greatest enemy. How did this happen? The ethical question here is to what extent are we, as masters or custodians of this world, responsible for this tragic outcome? Is it still possible to recover that early sense of connectedness with nature?

This brings me to the second term in the title of the conference: survival. When we talk of the endangered planet and survival, whose survival do we mean? The conservation policies and pollution and population control schemes all over the world attest to a greater awareness of the threats under which we live in the modern world. Once more we are discovering our close ties with 'Nature' and our dependence on it. We are back where we started, only with a difference. The endangered planet is now a secular idea. We are thinking more in terms of resources that are fast being used up and the future of humanity, and the humanity we are concerned about is largely our own national or regional community. As long as we dispose toxic wastes in a remote part of the world, we can go on producing them to enjoy the modern comforts of life and a lucrative economy in our corner of the earth. That we are not entirely honest in our attitudes towards environmental issues and in our understanding of the need for survival is also evident in our response to the right to survival. For, as Harold Fromm rightly asks, how else can we explain the fact that 'animals' rights and fetuses' rights fall at the opposite ends of the political spectrum instead of in the very same position? (26) Since, in our desacralized world, survival means the sustainability of the resources, how can we guarantee this sustainability? Another important ethical question is, then, who are we going to throw overboard from the Lifeboat Earth? . Who deserves to be left behind?

And this brings me to my last question: Why do we care? We care because we want to live in a safe environment as long as we exist and also because we want to leave a safe environment for posterity. The ethical question here is how far into the future should we project when we draw up our survival and sustainability strategies? And to what extent should future generations count when we plan our strategies of survival? Why not plunder and use up all the resources now, instead of thinking about the future? But more importantly, should we care about the survival of the planet itself, even after the human species become extinct? The Australian philosopher Richard Routley invites us to imagine a situation in which the last human survivor of a global catastrophe destroys all other living things and the landscape, leaving nothing behind before he dies. Would this be a moral act, he asks (Routley and Routley, 1980).

These and several other related questions are ethical questions but they cannot be answered easily by traditional ethics, because it is human-centered. Environmental issues necessitate a whole new approach to the environment and a challenge to this anthropocentrism. Environmental ethics provides this challenge. What is special about environmental ethics is that it carries ethical discussion into the non-human realm; the realm of not just sentient beings, but also non-sentient animals, plants and rocks. According to environmental ethics, human beings are not separate from Nature, but *are* Nature, because they are not only humans but also 'mammals, animals, life forms, earth beings' and the necessity to think in human terms is only an 'alleged necessity' (Weston, 3-4). What has brought about an environmental crisis is precisely this anthropocentric view, according to which the world is created for the benefit of mankind and it is okay to plunder it in the name of human interests. This view came to a dead end in the twentieth century, as resources were understood to be finite and began to be threatened by thoughtless use of industrial chemical products and by the overpopulation of the earth; the needs of this great population far exceeding whatever 'resources' the earth might provide. Hence, we saw the rise of a new science, ecological science, which assesses the damages done to the natural environment and suggests ways of remedying it. This is why we have, in many parts of the world, conservation policies, sustainability strategies and pollution and population control programs.

We also have (sometimes very strict) laws and regulations imposed on industrial companies and corporations to harmonize their self-interest with what is considered environmentally responsible behavior. Although they are meant to be sincere policies which force us to understand our real place on this planet and our ethical responsibility in the harm that was (and is continuing to be) done to it, such schemes are still anthropocentric, in the sense that, they still treat the environment as something that needs to be saved for the sake of humankind, or else *we* will not have any future on this planet.

The opposite view is known as the 'biocentric' view, which looks at the problem from a larger perspective; dethroning man from his privileged center position, it asserts that nature has a value independent of human valuation. It sees the whole environment as a biosphere, in which both human and non-human beings have an equal right to survival on account of their intrinsic value, and this value is grounded on such concepts as rationality, sentience, or integrity.

The question of rights is an ethical as well as a legal question. Therefore, it calls for a new understanding of ethics (specifically environmental ethics) along with new laws and regulations mentioned above. According to the first view, which subscribes to an understanding of nature's instrumental value, the new ethics foregrounds our environmental duties and obligations, because it is a question of human survival. We owe it to each other and to the generations to come, to protect the environment and natural resources. According to the second, we are in a moral relation not only with each other and with the future generations, but also with nature. But, according to the utilitarian philosopher John Passmore, to think of such a relationship which confers rights on the non-human world is absurd, since non-humans are not members of a moral community and hence they cannot be said to have rights (Zimmermann, 45). Passmore also urges the new environmentalists to think honestly and realistically about such issues, since he thinks that, in the final analysis, utilitarian concerns will always override environmental concerns. To him, all that biocentric talk about our connectedness with nature is 'romantic or Oriental drivel' (Hargrove, 103). Following Passmore, Patrick K. Dooley finds a serious fault with the 'respect for nature posture' of the biocentric world view, by saying that when lives come into conflict, this argument makes it difficult to choose between individuals and species, and it faces a dilemma: it either has to rank the relative value of various life integrities, or, flatly refuse to discriminate among life entities and refuse to rank them. But, if it chooses the first option,

"…the ranking of life integrities converts the biocentric position into the homocentric world view, complete with humanistic biases. But taking the second option, the equating of wild flowers, mosquitoes and humans, generates patently absurd moral assessments. For example, if every living thing has an equal status, an insecticide, a germicide and a homicide would have equivalent moral seriousness (52).

In both of these general views about environmental responsibility, whether it is seen primarily as a responsibility towards other humans or towards nature, the moral agents are human beings. Since we cannot possibly expect a tree or an animal to be morally responsible to us humans, it is a one way moral relationship between the human and the non-human world, and therefore still anthropocentric in its essence.

And yet, as humans we do need to temper our anthropocentrism and find a middle way to establish moral grounds for the social policies designed for the protection of the environment and to prevent further damage to it. But what *are* the moral grounds on which such a view can be constructed, and what can be done to make it really convincing? Well, we must first remember that the earth has a far older history than the coming of the humans into the scene, and it does not necessarily have to end with the extinction of the human species. We might also adopt the basic principle of the 'land ethic' of the American naturalist Aldo Leopold: 'a thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise' (225).

Good, but not strong enough an argument to override utilitarian interests. Here is another argument advanced by Gayatri Spivak. She maintains that since our exploitation of the planet is caused by a process of thought which enabled us to see the environment as our other, this othering process can be overcome if we adopt what she calls 'planetary thinking'. According to Spivak,

To be human is to be intended toward the other. . . If we imagine ourselves as planetary subjects rather than global agents, planetary creatures rather than global entities, alterity remains underived from us; it is not our dialectical negation, it contains us as much as it flings us away. (*Death of a Discipline*, 73).

Spivak says, "If we planet-think and planet-feel, our 'other' is then everything in the unbounded universe. It cannot be the self-consolidating other, [because] "The planet has no fixable other" (Keynote speech at 'The Endangered Planet in Literature' Conference). This planetarity is a state of mind which crosses the borders and necessitates collectivity, and the planet of mind, she asserts, will finally sustain the planet of land (Keynote Speech).

It must be a lot easier for our contemporaries to adopt such a planetary consciousness, since modern science makes it possible now to see our planet in the outer space photographs in all its beauty, glory and uniqueness. As J. Stan Rowe observes, "Here is the Real Thing, the living Earth or Gaia. A magnificent self-perpetuating ecosystem, it compels us to see ourselves truly: immersed in it, supported and maintained by it, at one with [its] mysterious processes of change and development' (6). Thus, planetary thinking will help us recover our original animistic approaches to the planet in this world of post-rational science. Spivak notes again, that in the representation of planetary destruction there are already signs of such an approach, because they are sacred and transcendental (Keynote Speech). Evelyn Shirk also emphasizes this transcendental quality in the language we use about our relations with the physical world: 'We speak of "hurting" or of "benefiting" the environment; of "polluting" and "rescuing" it; of "nurturing" or "exploiting" it and even of "respecting" its "integrity". Such talk is neither anthropomorphic nor metaphorical. It truly expresses that we are, *in fact*, in a moral relation to the non-human world…' (83).

Val Plumwood is equally hopeful about humanity's chances of abandoning its tendency to see nature only in terms of its instrumental value. Modern liberation politics and theory, she argues, is really about a series of struggles with a hoard of 'centrisms'. Feminism is a fight against 'androcentrism'; anti-racist theory is a fight against 'ethnocentrism', or more specifically 'eurocentrism'; and gay activists struggle with 'hetero-centrism'. Surely, there is something to be learned from these 'relatively successful (at least, relatively formulated)' critiques in our critique of human-centeredness (70).

Like Spivak, Plumwood also sees anthropocentrism as the othering of nature. This anthropocentric othering is no different in nature than the androcentric or ethnocentric forms of othering, since it is based on the same logic of the 'One and the Other' (87).

All of these philosophers emphasize the role of immediate experience and a sense of connectedness with nature in overcoming our habit of seeing everything in human terms, using always human reference points, in short what Anthony Weston calls our 'species-egotism' (5). If, as Joseph Grange observes, 'What is required to expand and develop environmental ethics is …an envisionment of the multiple ways within which environments interact, change occurs, and values are transferred around a system of interconnected events' (176), one can only say that art, and literature in particular, has been doing that all along, and it has a far older history than environmental ethics.

Aesthetic activity can be described as a form-giving activity arising out of the 'joining' encounter of the subject with the object. Thus, as Rowe puts it, 'each artistic work and each artistic encounter is a completion, a unifying insight at some level of significance. The search for continuity in art…is also a search for connectedness with nature, without which higher levels of experience will remain undiscovered and lower levels will be deprived of their unifying context" (9). Literature leads to an understanding of this connectedness and makes the imaginative leap from the self to the other easy and enjoyable. An aesthetic experience is also disinterested and has a transformative value, which helps us go beyond the egoistical human dimension, while it translates the non-human into human terms. For, let us be honest about ourselves: We cannot be expected to understand anything unless we see it in human terms. Even in documentaries, especially the BBC ones made by Sir David Attenborough, a little drama helps our understanding of the non-human species and creates immediate interest and love. Art and Nature are two different things. Without the magic of art, our 'natural' experiences are bound to remain individual and temporary, however awesome they might be. For nature has a boundless creativity and diversity, but contact without communication does not make a lasting impression.

It is often said that all early literature is eco-literature in the sense that it expresses a deep connection with the physical environment and that the pagan sense of connectedness, the magic that nature both contains and inspires is lost forever to modern man. Romanticism tried to recapture that sense of wonder, joy, awe and reverence for nature mankind had in its early days of development. Wordsworth tells us how excited he feels each time he sees a rainbow':

My heart leaps us when I behold
A rainbow in the sky:
So it was when my life began;
So is it now I am a man;
So be it when I shall grow old,
Or let me die!

He also bewails its loss in later years:

The Rainbow comes and goes,
And lovely is the Rose,
The moon doth with delight
Look round her when the heavens are bare,
Waters on a starry night
Are beautiful and fair;
The sunshine is a glorious birth;
But yet I know, where'er I go,
That there hath past away a glory from the earth.

Coleridge's guilt-ridden Ancient Mariner, who killed an innocent albatross, is redeemed only when, in a momentary vision, he sees the beauty of the water snakes, which seemed to be ugly, slimy things in a rotting see before:

Beyond the shadow of the ship,
I watched the water snakes:
They moved in tracks of shining white,
And when they reared, the elfish light
Fell off in hoary flakes.

Within the shadow of the ship
I watched their rich attire:
Blue, glossy green, and velvet black,
They coiled and swam; and every track
Was a flash of golden fire.

O happy living things! No tongue
Their beauty may declare:
A spring of love gushed from my heart,
And I blessed them unaware:
…

The self-same moment I could pray;
And from my neck so free
The Albatross fell off, and sank
Like lead into the sea.

William Blake talks about the sense of awe one feels even at the mental evocation of a fierce animal in his tiger poem: "Tiger! Tiger! burning bright/In the forests of the Night/What immortal hand or eye/ Could frame thy fearful symmetry?"

For Emily Dickinson

The Lightning is a yellow Fork
From Tables in the sky
By inadvertent fingers dropt
The awful Cutlery

But it is not only the Romantics who thus brought together the human and the non-human. In "Snake", D. H. Lawrence's persona describes a similar appreciation to that of the Ancient Mariner when he spots a snake that has come to drink from his water trough:

Someone was before me at my water trough,
And I, like a second-comer, waiting.
. . .
But must I confess how I liked him,
How glad I was he had come like a guest in quiet, to drink at my water trough.

In a much less striking language than Blake's, but with an equal force, the Modern poet Robert Frost also describes a meeting of man and beast in "Two Look at Two". Two hikers on a mountain side come to the edge of the woods, and just when they decide to go back, thinking there is not much more to be seen, encounter first a gentle doe, and then an 'antlered buck of lusty nostril'. They stop and stare at each other briefly in silence, and then the animals pass on.

Two had seen two, whichever side you spoke from.
'This must be all.' It was all. Still they stood,
A great wave from it going over them,
As if the earth in one unlooked-for-favor
Had made them certain earth returned their love. (Lathem, p. 229)

This is an illuminating moment for the hikers, a moment of elation. The line 'Two had seen two, whichever side you spoke from' breaks down the barriers separating man and beast and places the deer on an equal footing with humans.

In *The Other Side of the Mountain*, the Turkish writer Erendiz Atasü, extends this connection to the whole planet and makes us think about our physical connectedness with it. In a truly shamanistic fashion, she first animates the inanimate by calling the soil 'the membrane of the universe that covers its organ, earth':

'The flesh of the earth is made up of people'. No, it is not a metaphor. The soil filling my hand, the physical texture of the very matter I feel on my palm, is made up of generations of people, living and dying. . . .

> The flesh of the earth, which finds fresh life in decaying human corpses to breed the plants which are my sisters and brothers, bears the name of 'homeland'!
>
> I have to keep in touch with the flesh of this homeland as intimately as I do with my own. (258-59).

Later on she even breathes a soul into it:

> If 'feelings' are products of biochemistry, might not the reverse statement also be true? That biochemical reactions are actually 'feelings'?
>
> At this point all the obstacles, the boundaries and the walls within my mind are removed. Like the essence of a cell pouring out into neighboring tissues when the cell walls have dissolved, my mind flows into the universe. A brilliant light illuminates my thoughts. How simple everything is! Is this a rare moment of enlightenment, or the onset of lunacy? (271)

William Shakespeare displays the same 'lunacy' in *The Tempest*, when he makes Ariel sing to Ferdinand, who thinks his father is drowned:

> Full fathom five thy father lies;
> Of his bones are coral made;
> Those are pearls that were his eyes:
> Nothing of him that doth fade,
> But doth suffer a sea change
> Into something rich and strange.
> (I. ii. 398-404)

In 'The Figure a Poem Makes', Frost describes poetry as a moment of such an enlightenment. 'It begins in delight and ends in a clarification of life: 'not necessarily a great clarification, such as sects and cults are founded on, but in a momentary stay against confusion'. Though not a founder of sects or cults, the poet (and by extension the writer) is both a visionary and a shaper of the world. If we are to understand our proper place in this earth as part of the biological community rather than its other, literature can help us tremendously to cultivate such a view.

It also articulates the crisis we are facing in a much more accessible language than the language of scholars and philosophers. Let me conclude with another poem by Robert Frost, which sums up the present situation:

Pan with Us
Pan came out of the woods one day,--
His skin and his hair and his eyes were gray,
The gray of the moss of walls were they,--
  And stood in the sun and looked his fill
  At wooded valley and wooded hill.
He stood in the zephyr, pipes in hand,
On a height of naked pasture land;
In all the country he did command
  He saw no smoke and he saw no roof.
  That was well! and he stamped a hoof.
His heart knew peace, for none came here
To this lean feeding save once a year
Someone to salt the half-wild steer,
  Or homespun children with clicking pails
  Who see so little they tell no tales.
He tossed his pipes, too hard to teach
A new-world song, far out of reach,
For sylvan sign that the blue jay's screech
  And the whimper of hawks beside the sun
  Were music enough for him, for one.
Times were changed from what they were:
Such pipes kept less of power to stir
The fruited bough of the juniper
  And the fragile bluets clustered there
  Than the merest aimless breath of air.
They were pipes of pagan mirth,
And the world had found new terms of worth.
He laid him down on the sun-burned earth
  And raveled a flower and looked away--
  Play? Play?--What should he play?
(Lathem, p. 23)

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EVALUATION OF RECENT AMENDMENTS INTURKISH ENVIRONMENTAL LAW

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Many amendments related to various subjects were made in Environment Act, 2872 by an Act, 5491 on 26 April 2006. The recent Environment Act was published on 13 May 2006 in Official Gazette. The amendments will be examined from legal point of view. The effects of amendments in environment law will be studied as comparative with prior Environment Act.

Responsibilities of chambers of profession, professional unions and non-governmental organisations for protection of environment and prevention of pollution are regulated in recent Environment Act. High Council of Environment was established by this Act. The principles of protection and usage of biological diversity will be determined by views of non-governmental organisations.

INTRODUCTION

Significant amendments in Turkish Environmental Legislation have been realised recently. In this paper, amendments related to Environmental Law are examined in context of drafts and acts which have been entered into force.

ACT ON RIGHT OF ACCESS TO INFORMATION

The '*Transaction Center for Right to Access Information*' has been established in the structure of Ministry of Environment and Forest, to answer and to evaluate the applications which will be made on internet, according to '*Act on Right of Access to Information*', '*By-Law on Application for Act on Right of Access to Information*', '*Prime Ministarial Instruction on Petition and Usage of Right to Access to Information*' and '*Act on Usage of Right to Petition'.* Application forms have been prepared as for individual applications and for application of legal persons separetely. Application procedure is regulated in Article 9 of By-Law on Implementation of Act on Right of Access to Information and applications by electronically or other communication means have been regulated in the Article 10 of the By-law. While application could be made by electronically, application for objection to Council of Evaluation and Access to Information must be made as written, pursuant to the Art.24 of By-Law on Implementation of Act on Right of Access to Information and unwritten applications haven't been considered by the Council of Evaluation and Access to Information. It is not possible to understand the reason why application procedures and objection procedures have been regulated in different manner and to accept the objections could only be made as written. Moreover, it is not possible to qualify the Council of Evaluation and Access to Information which has been established for settling disputes between the administration and individuals during implementation of the right of access to information, as an independent administrative authority.

Because, the secretariat services of the Council are performed by Prime-Ministriat according to the Article 14, par.9 and 10 of 4982 numbered Act and principles and procedures are related to the duties and actions of the Council which are regulated by a By-Law which is prepared and entered into force by Prime-Ministriat. So, the Council has an administrative structure tied to the Prime-Ministriat, it is impossible that the Council is qualified as an independent administrative authority. According to Article 6 of Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC[30], it is provided for an administrative procedure for an interested person's application whose application has been refused and the authority which will inspect the whole applications is an independent and neutral organ. The Council of Evaluation and Access to Information, which act in Prime-Ministriat and whose working essences have been determined by the Prime-Ministriat, doesn't have the requirements provided in the Article 6 of the Directive. About dissemination of environmental information, Article 7 of the Directive 2003/4/EC states that Member States shall take the necessary measures to ensure that public authorities organise the environmental information which is relevant to their functions and which is held by or for them, with a view to its active and systematic dissemination to the public, in particular by means of computer telecommunication and/or electronic technology, where available. Member States shall ensure that environmental information progressively becomes available in electronic databases which are easily accessible to the public through public telecommunication networks. In Turkish Legal System, administrative authorities concerning the environment do not have such an obligation[31].

ENVIRONMENTAL ACT

Act on the Amendments in Environmental Law, 5491 which was accepted on 26 April 2006, was entered into force upon its publication in Official Journal on 13.05.2006. It is possible to summarize the innovations which have been introduced to Environmental Act, 2872, by this Act, thusly;[32]:

- *'Principle of sustainable development'* has been placed into the Articals titled '*Purpose and principles'* of Environmental Act. The concepts of '*Sustainable environment'* and '*sustainable development*' have been defined. Definitions of '*information related to environment'* and *'strategic environmental evaluation'* have been made in the article *'Definitions'*(Article 2 of Act, 2872 amended by Article 2 of Act, 5491).

The Article in which the principles concerning with protection of environment and prevention of pollution has been determined, was regulated again and some principles, related to usage of economic means for protection of environment, based on right to participation to the formation of environmental politics, on usage of well-adjusted to environment technologies, which provide recycling of wastes and decreasing waste existence in its source, have been brought.

[30] OJ L 41/26-32, 14.2.2003
[31] Kubilay, H.,Gürsel, M. K.,Öğütçü, M., Right of Access to Information from the Viewpoint of EU and Turkish Law, X. European Ecological Congress, November 08-13, 2005, Kuşadası-Turkey, 230.
[32] Pepe, 17.

By regulation of the establishment and duties of the High Council of Environment again, a possibility for formation of the High Council of Environment at the highest level, has been granted and important authorities, like, to define of environmental politics and strategies, to integrate of environmental dimension to economic decisions, have been adressed to the Council. For the purpose of implementation of the principle of *'The right of participation is fundamental for the formation of environmental politics',* a possibility on the participation of professional institutions, non-governmental organisations, representatives of local administrative and representatives of scientific institutions, to preparation and evaluation meetings, which will be held for the works of the Council, has been provided.

The Article on protection of environment has been regulated again and some provisions on the authority of Ministry of Environment and Forest related to the protection of ecosystem, well-watered places and natural sources which shelter biologic diversity, have been brought.

By regulating a new Article on obligations of enterprises which will cause environmental pollution, more detailed provisions have been brought than the previous provisions, the units which are liable from establishments of waste water infrastructure systems, and general rules related to the management of wastes have been defined

A mandatory regime for enterprises and establishments, has been established to take under control and to prepare emergency situation plans which will be applied to decrease the negative effets of accident to environment, in case of probable accident.

An obligation has been brought for coastal enterprises like ports, shipyards, marines, to build establishments for receiving, storing and destroying wastes which are sourced from ships and other sea vehicles.

The provisions on the control authority for implementation of Environmental Act and on the authority to stop and apply administrative monetary punishment, are enforced by the Ministriat of Environment and Forest. However, the authority could be delegated to presidencies of municipalities which establish environmental control units and other public authorities approved by the Ministriat and the controls are made in context of procedure and principles which have been defined by the Ministriat.

The provisions on management of dangerous chemicals and dangerous wastes have been regulated by a seperate Article and an obligation to form a compulsory liability insurance against damage to person after an accident, have been brought. The obligation to form an liability insurance has been regulated in the Article 10,14 and Temporary Article 1 of the Act, 5491. According to Temporary Article 1, liability insurance general provisions which have been defined by the Undersecretariat of Treasury, and instructions which will be approved by the Ministry to whom the Undersecretariat of Treasury has been tied, will be published in one year after the Act entered into force.

By the modificaton of the Article related to 'Noise', a rule on 'vibration' has been regulated (Article 14 of the Act, 2872 which was modified by Article 11 of the Act, 5491).

The provisions related to *'environmental volunteers'* have been amongst the amendments of Environmental Act.

The crimes have been defined seperately and seperate sanctions (administrative monetary punishment) according to weight and qalification of acts, have been regulated. The amounts of punishment have been increased to prevent crimes against environment[33].

Some new income sources have been created and the procedures and principles for spending of this income, have been regulated.

The Article 29 of Environmental Act, 2872 related to encouragements have been regulated. The Council of Ministries have been authorised for decrease to %50 on tariffs of electric energy which have been used in purifying establishments of the enterprises that establish, operate and perform all duties regulated by by-laws and on tariffs used in industrial establishments.

The heading of the Article 30 was modified as *'Right to Access to Information and Right to Application'.* According to the Article 30/II, everybody has the right on access to information related to environment in scope of Act on the Right of Access to Information.

ACT ON PRINCIPLES RELATED TO INTERVENTION AND COMPENSATION OF DAMAGES AGAINST POLLUTION OF SEA ENVIRONMENT BY OIL AND OTHER HARMFUL SUBSTANCES IN EMERGENCY CASES

The purpose of this Act[34] is to define the procedures and principles, on providing sea safety and preventing pollution dangerous sourced from ships and coastal establisments in emergency cases, taking into consideration rights and obligations arising from international law and domestic law on prevention of sea pollution or the bases on intervention and being ready which will be applied for diminishing, limiting or compensating pollution and authorities, duties and liabilities of interested persons of ships and enterprises in the field of this Act(Art.1 of the Act, 5312).

A kind of compulsory insurance has been introduced. Coastal establishments have to form compulsory insurance against damages in context of this Act (Art. 8 of the Act, 5312).

[33]TİSK'in Çevre Kanunu'nda Değişiklik Yapılmasına Dair Kanun Tasarısına İlişkin Görüş ve Önerileri, www.tisk.org.tr

[34] '*Act On Prıncıples Related To Interventıon And Compensatıon Of Damages Agaınst Pollutıon Of Sea Envıronment By Oıl And Other Harmful Substances In Emergency Cases*', 5312 which was accepted on 03.03.2005, was published in Official Journal on 11.03.2005-25752 and entered into force after three months from the publication date.

TURKISH CRIMINAL ACT

'*Crimes against environment*' in the Articles 181-184, Third Chapter (*Crimes against society*), Second Section of Turkish Criminal Act, 5237. Polluting environment intentially (Art.181), polluting environment by negligence (Art.182), causing noise (Art.183) and causing pollution in public works (Art.184) are the main provisions regulated in this Chapter. By defining the actions that polluting environment intentionally as crimes, the rights of people to live in a healthy environment have been protected[35]. In the Article 181/I, a crime which is formed by the wastes and surples are given to ground, water and air, has been regulated. However, in case of wastes and surples have been left to natural environment as convenient to technical procedures defined by acts concerning with wastes and surplus, it cannot be said that there has been an exitence of an unlawful behaviour and a crime. Those technical procedures should be defined by acts related to protection of environment. In the Article 181/II, importation of wastes and surplus to country without any permission, is defined as a crime. According to the Article 181/III, if wastes and surples have permanent influence in ground, water and air, this situation has established the reason of increased punishment. The qualifications of wastes and surplus have been accepted as a qualified situation which requires the application of increased punishment. If wastes and surplus cause to arise an illness which is hard to cure for individuals and animals and having qulifications which may cause to change the natural characterisitcs of fauna and flora, a heavier punishment will be applied. Some precautions for security are applied on legal persons. A criminal sanction is only applied on natural persons, pursuant to the principle of '*individuality of criminal sanctions*' which has been taken under security in our Constitution[36]. When searching Article 60 of Turkish Criminal Act which have regulated security precautions, it is understood that the security precautions could only be applied on private legal persons but not on public legal persons. The heading of the Article should be modified convenient to the Article's content and reason. The heading of the Article should be *'Security precautions on private legal persons'* instead of *'Security precautions on legal persons'.*

DRAFT ON THE AMENDMENT OF THE ACT AGAINST TERRORISM

The crime on '*pollution of environment intentionally*' which has been regulated in Article 181 of Turkish Criminal Code, when the crime has been performed by the intention of terrorism and as an act of a terrorist organisation, is deemed a terror crime.

TURKISH COMMERCIAL CODE DRAFT

According to the Reasons for Turkish Commercial Code Draft, it has been indicated that one of the developments which effects Turkish Commercial Code directly is the influence of liability law. The provisions related to environment have been placed in the articles 1003, 1302, 1303, 1305, 1312, 1318, 1323, 1330, 1364 ve 1369 concerning with Maritime Commercial Law and in the Articles 914, 916 concerning with Transportation Law of the Draft of Turkish Commercial Code, for the first time[37].

[35] See, the reason of the Article 181 of Turkish Criminal Code.
[36] See, the reason of the Article 60 of Turkish Criminal Code.
[37] Draft of Turkish Commercial Code , s.334 (002).

DRAFT ON PUBLIC-PRIVATE PARTNERSHIPS

A Draft on an Act concerning with the realization of some investments and services in context of models based on participation public and private sector, which will also be applied to investments and services in the field of environment, has been prepared.

CONCLUSION

Although many modifications and amendments have been made in our Environmental Law Legislation, it is understood that those developments are not sufficient.

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SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL JUSTICE

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This paper attempts to discuss the subject of sustainable development and environmental justice. Two subjects will be tried to integrate here. Environmental justice is being assumed as the "a fair utilization" of environment between developed and developing countries. The concept of fair utilization is a difficult subject. The paper will make an attempt to discuss the subject, formulate the problem and develop some policies. The abstract is going to give some insight to defination of the problem.

Environmental fears can be classified into three broad groups:

- rapid depletion of natural resources,
- food safety problem associated with population growth,
- pollution of air, water, and soil.

Although all of them are important, food problem and pollution take more attention. It is being thought widely that human activity is becoming more and more harmful for the earth and even killing itself. Sometimes the evidance and data reveal another fact and different situation. This can be explained with the concept of sustainable development.

Sustainable development integrates different policy tools. It impozes to take economic cost-benefit trade-offs into account on environmental laws, and keep environmental trade-offs in mind with economic development. There might be, however, a contradiction between "development" and "sustainability".

Sustainable development counts implementation and development of policies and programmes for the effective management and wise use of the environment, promotion of educational and public awareness programmes, determination of all appropriate actions for the prevention and control of pollution and conservation of the environment, and economic development.

Ecosystem, biodiversity, human well-being and related services are assumed the word under "environment". There are a number conventions on this. Environment is being perceived differently by different people, and organizations. These groups are assumed to be the users of environment, along with the conventiones. The users are; people, business community, government. People might live in urban and rural parts of country. Then, the following analyzes adopted in terms of users in developed countries and developing countries.

Users are people who can live in developded and devoloping countries. People in developed countries are assumed to be more concerned on environment. Government regulations and civil society's rules, along with public awareness" make people respectful about environment. This includes more environmentally friendly living styles in developed countries.

Yet, business community in developed countries give the worst harm to environment. During the 1950s, 1960s, and even in 1970s, when the concept of enviironment had been differently understood then the recent years, and that economic growth had been assumed more important than everything else, environmental degradation was important in developed countries. From consumer goods production to energy production, from mining to investment goods production; the priority was given to more production whatsoever the cost to environment. Polluted weather, soils, rivers, lakes, smoked cities... were common. People and countries reached to welfare, high employment, high growth rate.

Governments played a crucial role during this period. They encouraged industrialization with different support policies.

After 1980s, people, along with civil organizationes, have become more concerned about environment. They realize that, once environment has gone, it will generate chain reaction in nature in such a way that no economic growth or welfare were compensate it. People concern about the future generationes where they can live in bad conditions. This is a kind of responsibility between current generation where grown up in a clean environment and fear of this generation about the future generations who can live worse conditions. Some economists suggested "zero economic growth" in the 1960s. But, concern about environment have flourished mostly in the late 1970s and 1980s. The Brutland Report, The Stockholm Decleration, Rio and Johannesburg Summits are the corner stones. But more importantly, public awareness about environment may be accepted as remarkable. This concern affected international donor organizations and governments to become more carefull about environment. In addition, new technologies halped protecting and cleaning environment. Environment isstill a big concern in developed countries, and some progress have been reached. It does not mean all problems have been solved and a stable and "golden-age"equilibrium have been reached. There are more to be done in developed countries.

The situation is different in developing countries. There are the same users groups available in these countries: People, business community, and governments. There are some conflicts exist among these three groups as it did in developed countries. The most important question is; how much demand for environment exists in developing countries? Do people demand good environmental services? Or do they more concerened about the survive, even if it is against environment? How much concern exists for environment among poor people in the most part of Africa, Latin America, and South East Asia? What is the value of environment, and, can we assign a value? How should we value the future? This does not imply that peole in developing countries destroy environment. It is only a situation where the size of population, the wealth level of these people; and the carying capacity of environment is well suited. Unfortunately, these two realities are conflicting with each other. Increasing population and declining productive services from environment make people against environment. Survive becomes more important than environment.

Business community in developing countries are not well developed. Since they are not developed, but would like to develop, they may not pay attention to environment in most production processes. Nevertheless, the small size of industry generates low level of industrial pollution. Unfortunately, the problem is big and poor cities, low- productive agriculture and animal husbandry, and therefore urban and agro-based pollution. Therefore, by contrast to developed countries, industrial pollution is not common in developing countries. This is not to blame business community in developing countries, but it seems a realistic observation.

Governments are, like in develoed countries, are some how in-between in developing countries. On the one hand, they are under quite intensive pressure from people who are looking for job and food, on the other hand, concern citizens, civil organisations and international donor organisations which are trying to find the ways for "clean environment". "Factory chimneys smell like money" is a common pharese in developing countries. Indeed, most developing countries are consuming their resources fast.

I. Introduction

This paper attempts to discuss the subject of sustainable development and environmental justice. Two subjects will be tried to integrate here. Environmental justice is being assumed as the "a fair utilization" of environment between developed and developing countries. The concept of fair utilization is a difficult subject. The paper will make an attempt to discuss the subject, formulate the problem and develop some policies. The abstract is going to give some insight to defination of the problem.

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II. Sustainability and Descriptions

Sustainable development integrates different policy tools. It impozes to take economic cost-benefit trade-offs into account on environmental laws, and keep environmental trade-offs in mind with economic development. There might be, however, a contradiction between "development" and "sustainability".

The issue of development and sustainability came into attention at an UN summit in Stockholm in 1972. Until 1987, a hot debate continued between politicans and social activists in developing and developed countries. The Brundtland Report in 1987 concluded that "meets the needs of the present generation without comprimising the needs of future generation" and "development and the environment were inextricably linked". Therefore sustainable development incorporates the interrelationship and the interconnection of the environment, the economy and the people on the world. All interested parties have accepted this view. The World Bank also accepted a policy as ending environmentally harmful subsidies in order to help economy and environment in 1992.

Sustainable development counts implementation and development of policies and programmes for the effective management and wise use of the environment, promotion of educational and public awareness programmes, determination of all appropriate actions for the prevention and control of pollution and conservation of the environment, and economic development.

1. Among the three broad problems pointed out above, ***the population growth and associated food scarcity*** have always received attention from all scientists.since 200 years. Thomas Malthus was the first one who claimed that, if unchecked, human population would increase exponentially, while food production could increase only linearly, by bringing new land into agricultural production. He concluded a widespread starvation in the world. It did not happen for, at least, two reasons. The first reason is that population growth is not exponential, it has internal check: As societies become developed and healthier, they have smaller families. The peak point of the human population reached in 1960 with 2 percent growth rate per year. Since then it has regularly declined, 1.25 percent now and expected to be 0.5 percent by 2050. The world population is around 6 billion now and expected to reach 11 billion by 2050.

The second reason is associated with ***agricultural technology***. Agricultural technology has shown important and challenging developments in the last several decades. Agricultural technology has provided the production of more agricultural output from each unit of land, but it is mostly advanced by developed countries and that they barely share it with developing ones which mostly need this technology. In addition, agricultural support policies in the USA and EU cause over production, but this surpluses do not reach to developing countries because of high prices. Therefore, the main problem is not the unsufficient production of food, but unequal distribution of it. It comes here the issue of new agricultural technologies and new approaches to transfer of intellectual property rights (patents, copyrights, trade marks and trade secrets) to devceloping countries.

During the 1960s and 1970s, the "green revolution" raised the hopes in the developing world. Millions of farmers started using higher yielding seeds, chemical fertilisers and pesticides. The results were remarkable. There was so success in India that America stopped sending food aid and India was exporting surplus grain by 1990. Chinese rice farmers successfully raised the rice production. As a result, the green revolution saved millions from starvation. This success achived in the cost of environment. Governments subsidized chemicals, which stimulated over use. But the main concerned about the green revolution is that it has run out and that the gains from productivity is almost finished. There are a few regiones-mainly in Africa- where its techniques have yet to be employed. A new approach and improvement of the productivity of farmers in developing countries is necessary.

The most powerful approach is ***biotechnology, and especially genetic modification***. But this is a very young sience, and the first commercial products have come to markets in the last few years. Supporters of genetic modification claim that it is going to solve hunger problem, while opponents are still sceptical. Scientests have already succeded to obtain crops that are more resistant viruses and insects. Therefore, less chemical pesticide is necessary and this saves the environment. In the future, it is possible to produce cereals with more protein, vegetables with extra vitamins in a cheaper way. But the problem is that gen transfers between different species could create health risks. Another potential problem is related with environment: Genetically modified products might move into ordinary crop fields and fertile them. As with any new technology, it is impossible ever to prove that genetically modified foods are safe. It is essential to test these foods carefully before commercial consumption. Continous monitoring is also necessary.

The conventional wisdom is that as developed countries innovate new techniques, developing countries are lefting behind. While technology makes developed countries even more developed, it also makes developed countries more rich, healthier and better-fed. "Knowledge economy" is based on patents and that it seems to be central of prosperity and internationa trade. The World Trade Organisation is providing the global agreement on intellectual property rights. However, most of countries either do not have or do not enforce intellectual property rights. The World Trade Organisation requires that all countries to have some minimum protection by 2006. This does not mean a worldwide patent system. Rather, it determines a list of ground rules and describe the protection that a country's system must provide. Developed countries, particularly the U.S.A., claim that patents help to stimulate growth in developing countries by fostering domestic innovation, increasing foreign direct investment and improving access to new technologies.

This is a controversial claim. The disadvantages for developing countries are; expensive implementation of patent systems, unavailability of trained manpower and potential hurt on domestic industries since they are often based on copying. Agriculture is not an exemption. Developing countries may face even furher difficulties to obtain advance agricultural technologies.

2. ***Pollution*** receives a significant attention, but it diminishes when a society becomes richer, i.e., as a country becomes rich enough it will be able to afford to be concerned about the environment. As developing countries grow, this may be expected in the future. However, the question is at which level of income a nation become aware and concerned about environmental issues? The answer can change from one nation to another, but we should accept a threshold that shoul be passed.

3. The third important issue is ***depletion of natural resources***. The natural resource base is often critical for economic development. Therefore, management of natural resources and environment should be given a priority in macroeconomic ans sector analysis. Since the Stockholm Meeting, energy and other natural resources have not declined, but have even increased. The fear about natural resources was that the mineral resources that industry heavily depends would depleted. Indeed, the quantity of mineral ores and fossil fuels have a limit in quantity. But that limit is for greater than many people would have expected. By and large, reserves of natural resources have to be located on the earth which is a costly process. Nevertheless, advanced technologies help spotting new resources and known resources of all

fossils fuels and of most commercially important metals are larger in quantity now then known resources of some 30 years ago. In addition, alternative sources of energy and materials are being invented and becoming commercially available in large quantities and decreasing prices.

There is growing worldwide tendency on water resources and it receives a significat attention. Water is becoming extremely scarce resource in a large part of the world. Quality and quantity of surface and ground waters, their interrelations with ecosystem, water pricing policies, coordination programmes of water resources management across domestic and ınternational borders, transboundry water issues and strengthening of public participation are subject to interest.

As environment is concerned the following questions are always in mind: What is the value of environment, and, can we assign a value? How should we value the future? How should a number of uncertanities be integrated? Can we integrate environment into the system of national accounts?

There are, at least approximate, answers to these questions. Shortly, the value of environment would be determined with respect to "use value", such as food, biomass protection, recreation, flood control, etc, and "nonuse values" such as endengered species, esthetic values, conserved habitats, etc. Therefore,"the exact value of environment is impossible and ,indeed, not necessary, to determine, because, everybody may assign a different "value" to these items, particularly for those which "nonuse". A number of "approximate" techniques exist: contingent valuation, replacement cost estimation, the use of "surrogate" markets, travel cost, property values,...

Economic growth and performane are based on calculations. Physical resources, such as machineries and buildings are assumed as productive assets. A depreciation allowance is counted for them. Natural resources and environment, however, are assumed as "free gifts". This implies nonsustainable depletion of natural resources as income creation.

Interestingly, expenditures incurred to protect society against undesired environmental problems are counted as income,i.e., as increase in gross domestic product. By contrast, no count is taken the reduction in national wealth through the depletion of natural resources and environment. This situation provides false signals to policymakers. The loss of natural resources and environment receive no charge in national accounts against current income to reflect the decrease in potential future production. "True income", the maximum amount a recipient consume in a given period without reducing possible consumption for a future period, is sustainable income. Governments should know the maximum amount that can be consumed by the society without reducing country's environmental capital. Therefore, it is necessary a technique similar the principal of depreciation of manmade capital assets may be applied to the depreciation of natural resources and environment. The physical unit of depleted resources should be priced (or valued). Criteria for valuation may be on the basis of i) replacement cost when replacement is possible, ii) the discounted value of willingness to pay. A practical approach may be current price of depleted resource. However, this approach will focus on the net product; i.e., the gross product will still be unadjusted. As a second step, "the user cost approach" mau be employed to overcome that shortcoming.

The weakness of this approach, however, is the determination of discount rate: Discount rate converts the natural resource sales into a sustainable income stream. Once the discount rate is decided, the next step is decision on the time period during which resource is being depleted.

III.Globalisation and Sensitivity to Local Issues

Globalisation is a controversial isssue. There are pros and cons of globalisatişon. The critics of globalisation claims that globalisation is a force for oppression, exploitation and injustice. Moreover, they say globalisation is a cause for poverty.

These may be extreme position, but the antiglobalists have lately drawn support from a broad range of public. As a result, they have been anda re likely to remain politically influential. Since many in the West are contemplating their future with new fear, it is important to understand why the sceptics might wrong; why economic integration is a force for good, why globalisation may a cause against poverty.

However, a wide range of support for this view is lacking. More support for trade liberalization is uncertain in the developed countries. A new round of global trade talks is quite difficult. The institutions that represent global economy- the IMF, the World Bank and the World Trade Organization- are revilled for more widely than they are admitted. Governments are accused of bowing down to business, globalisation leaves them no choice. Private capital moves across the world unchecked. Whenever, it goes, it jepardizes democracy of content and puts “profit before people”.

Ironically governments and business, supposed defandent of globalisation may do more to undermine support for it than the opponents. Developed country governments generally present economic integration to people as an unfortunate, but inescapable fact of life. This has been the favorite excuse of any government about to break a promise for the last decade.

Last several decades have witnessed the rapid change in the world economy through globalisation and along with a common understandig has flourished that the international community should take action to ensure that developing countries have the opportunity from the forces of globalization. It is key objective is a forward-looking approach in a strategic and intensive manner, in order to assist these countries in their effort on sustained poverty reduction and economic development.

IV. Some Remarks on Environmantal Justice and Recommendations

The World Bank’s World Development Report on Poverty (1990) presented a strategy for eliminating poverty in the developing world. Developing countries have since grown much more rapidly than expected but poverty has proved more stubborn. UN’s “Type 2” partnership scheme, involving governments, businesses, non-governmental organiztions and local community groups offer the most prominent solutions.

1. Experiences have shown the importance of sustainable growth as a necessary condition for poverty reduction. The priorities for sustainable growth are macroeconomic stability, good governance, private sector development, social development, trade liberalization, and sound financial sector. Economic growth is crucial in the fighting poverty. But economic growth alone may not bring equitable distribution of the benefits of growth. At this point social policies, such as institution building, education in general but more notably education of women, skills development, beter health conditions and fighting against diease, are crucially important.

2. The West can do a number of things that may help the mitigating globalisation. The first thing they should do is to tell the truth about poverty, growth and the environment. The fifteen years since the Rio summit have seen a lot of progress in enhancing human welfare, especially in the most populous countries of the world. China and India are good examples. They both liberalise their economies and open their borders to more trade and investment. Such globalisation narrows the gap between North and South. Some countries of Africa and Middle East have choosen not to take a part in this process, and the are suffering from low level of life standartds. Measures can and should be taken to ensure that the future economic growth of the poor does not unduly exacerbate the problem of global warming.

3. The second thing that Western countries can do is to state clearly what they can and cannot do for the poor. They cannot "share assets more equitably", as some claim. Obviously, making the rich poorer will not make the poor richer. A growing economy and reducing poverty depends on domestic policies. Successful examples are S.Korea, China and India. The West can help to this process in three ways: i) by launching a serious debt relief funds for poverty reduction for the heavily indebted poor countries; ii) by opening their domestic markets to the goods, such as textile and food, that most poor countries are best suited to produce; iii) by concentrating their overseas aids on the fields, such as disases, urban infrastructure, that are difficult for poor countries to deal with themselves. Experience shows that economic assistance to countries with good governance stimulates growth and improves social conditions. Therefore, developed countries should encourage good governance, effectively in such countries that are serious about economic reforms and poverty reduction.

There are some positive developments that the above points could be achieved. Farm subsidies are subject to debate in developed countries. Ironically, developed countries defend free trade to the poor while lavishing farm subsidies on their own farmers. There is slow progress that, in the long term, United States put forward a proposal for reducing subsidies for agriculture. Although extremely political issue, similar steps should be taken in Europe. Therefore, there will be more agricultural export from poor countries to developed ones, particularly, sugar, coffee, cotton and other tropical commodities.

Dieases, namely AIDS, tuberculosis, malaria and diarhoea are negatively effecting African economies. Dirty water and poor sanitation are the biggest problem. Although faster economic growth would help poor countries to solve these problems, disase itself may prevent economic growth. On the other hand, maintaining, not only building, infrastructure is the real problem. Community-based initatives, privatisation, subsidies and cost-recovering pricing are the possible solutions to the maintainance problem.

Businesses, aid organizations and governments may try to cooperate reducing disases. The United Nations has been encouraged such cooperation. Rich countries should make further increases in their aid budgets to prevent disases, both bilateraly and through global funds.

4. A close link among trade, productive investment and growth play a critical role in promoting poverty reduction and sustainable economic growth. Developed countries must finds ways and to improve Access for these countries in international markets. WTO rounds, although difficult, must be ensure these ways, so that developing countries can benefit from globalisation and trade liberalization. Regional cooperation among these countries shoul be encouraged, since it often a first step towards further integration in global economy. Developed countries, along with The World Bank and WTO, must increase their efforts to help build trade-related capacity in the poor countries.

5. Many developing countries should be benefit from new agricultural techniques such as genetically modified organisms. But, people are suspicious agains these organisms and international organizations should share the research conclusions with developing countries in order to convince them.

6. Policies shoul be focused on four major groups in orde to design policies for helping the rural poor:

a) small landowners who can cultivate their land;
b) lanless tenants who can work other people's land;
c) landless labourers who depend on employment in the far mor nonfarm sectors;
d) women.

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ENVIRONMENTAL LAW AND ETHICS

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The environment is of special importance to the life of humans and other living creatures as well as to the economic, cultural and social development of the country, the nation and humankind as a whole.

The most important environmental crisis in the world today is due to the attitude of secular science based upon power and domination over nature and a technology, which devours the natural world with no respect for the equilibrium of nature. The ecological crisis faced by many developed and developing countries is in effect a moral one. The corruption of the environment is because of men's selfishness and exaltness, it specially refers to the actions of a small minority of the whole world community who expect everything to be to their own benefit, and all others must serve them.

Environmental protection depends in large measure on the cooperation and contribution of the people of the world. Governments must promote and encourage this, and have the responsibility to set and enforce rules.

Environmental laws include a vast variety of legislation, which is, in some way, concerned with the control of environmental damage.

There is a wide variety of means available for the enforcement of environmental laws. One of them is ethics. Environmental law cannot and will not succeed unless there is strong public commitment to conserving non-human nature. Therefore, environmental law will not endure or have lasting effect unless it is bases upon environmental ethics.

Keywords: *environmental ethics, environmental protection, environmental law, ethics*

Introduction

Each individual human being is a complex organism living in an environment.[38] What each individual becomes during his lifetime is a product of his engagement with that environment, a process in which he learns about the world and about himself.[39] Despite the differences regarding the inclusion of human beings as a part of the environment, we can consider humans to be part of the ecological system.

The conservation of the natural environment is a matter of utmost importance to man, who is its subject, its end, and its means. The importance of protection of the environment and caring for all things in the world is the only way for man and his continuation of the life. For protection of the natural environment from abuse by man leads to the welfare of man himself together with the welfare of all other beings. The need to protect the natural environment with all its biological components from the harmful activities of man has existed as long as history has been recorded. However, the problem has been magnified enormously within this century,

[38] - Gibson, J.J.(1979) The ecological approach to visual perceptions, Boston, MA: Houghton Mifflin, p.239.

[39] - Neisser, U. (1976) Cognition and reality: principles and implications of cognitive psychology, Sanfrancisco, CA: W.H. Freeman & Co., pp. 9-20.

as man's capacity to affect it has expanded with tremendous speed, while with respect to his responsibility of stewardship on earth, he remains unjust and foolish. Now, more than ever before, we witness in the accelerating degradation of our environment.

The environment belongs to everybody not for now but forever. Everybody can have a share in environmental protection. The story of protection of the environment by all people is the story of a man who puts fire in his room but when others object him, he replies that it belonged to him. It is obvious that nobody would sympathize him and all would blame him because when fire broke off everybody would be perished. Therefore, today nobody can be indifferent toward the problems of world's environment.

The role of man in environmental crisis

Because of bad and incorrect use of natural resources, which belong to all human beings, the nature cannot recover itself. Man has polluted the earth, the sea and the sky. This destruction is serious and is spreading out. The corruption of the environment is because of men's selfishness and exaltness, especially because of the actions of a small minority of the whole world community who expect everything to be to their own benefit and all others must serve them.[40]

According to scientists and philosophers, man is considered as the major factor in disturbing the natural balance of the universe. Man interferes intentionally or unintentionally in the earth's ecosystems by impairing its perfect order and precise sequence. It seems that man has cut off his nose to spite his face and he now is the victim. Grave dangers are manifested in pollution of the air, water, soil, outer space and others, as well as the irrational exploitation of the environment's resources, and inconsistent distribution of human settlements. All these factors have led to different problems, all of which are marked by a disturbance to the earth's natural balance. We can say that selfishness and aggression has overcome humankind, as they have become corrupters of earth, the surrounding atmosphere and neighboring outer space.

The Role of Man in Environmental Protection

The environmental crisis is serious, the life of whole human beings is in danger, and man is the only creature who is responsible to this serious problem. Nature has become desacralized for modern man, although this process itself has been carried to its logical conclusion only in the case of a small minority.41 Moreover, nature has come to be regarded as something to be used and enjoyed to the fullest extent possible.[42]

The harmony between man and nature has been destroyed. This lack of harmony between man and nature threatens to destroy them both together.[43]

We can say that the environmental crisis is not only the result of certain economic, political, and social factors; it is also a moral and spiritual crisis which, in order to be addressed, will require broader philosophical understandings of ourselves as creatures of nature, embedded in life cycles and dependent on ecosystems.

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[40] -Duman, Rene, L' Utopie ou la mort, Paris, 1980.
[41] - Eliade, M. The Sacred and the Profane, the Nature of Religion, New York, 1959, p. 151.
[42] - Nasr, Hossaein, Man and Nature, Mandala edition, 1976, p.18.
[43] - Schuon, F., ' Le commandmentsupreme', Etudes Traditionnelles, Sept.-Oct.1965,p.199.

According to Seyyed Hossein Nasr in his article 'Islam and the environmental crisis'[44], the most important environmental crisis in the Islamic world today is due to the attitude of secular science based upon power and domination over nature and a technology, which devours the natural world with no respect for the equilibrium of nature. This refers to the effect of secularization in Islam.[45]

What people do about their environment depends on what they think about themselves in relation to things around them. Human environment is deeply conditioned by beliefs about his nature and destiny.

The roots of our ecological crises lie in our belief and value structures, which shape our relationship with nature, with each other and the lifestyles we lead.[46] Therefore, the remedy lies in the direction and guidance of man and society, their values, laws, institutions, and actions.

Environment

The essence of the term environment in its widest connotation indicates both natural and manmade surroundings; hence, the environment may be divided into two categories. The natural environment incorporates every creation. It consists of all phenomena that emerge on the surface of the earth such as mountains, valleys, plains, oases, rocks, dusts etc. and the diverse atmospheric and climatic elements. It comprises all organic creations, be they vegetable or animal, aquatic or land living and all water sources both fresh and salty. The second category indicates the constructed environment, which includes the numerous edifices formed by man during his interaction with the natural environment in the fulfillment of requirements and desires, whether basic or otherwise.

In Islam the environment is termed *'bi'ah'* or '*muhīt*',[47] words that literally mean domicile, living place, or residence.

Terminologically, it indicates the surrounding elements in which man exists, including water sources, climate, atmosphere, soil and all organic creations, in addition to all the constructions erected in the course of satisfying human needs and desires.

Law

Law is a rule, usually made by a government that is used to order the way in which a society behaves, or the whole system of such rules.

By *law* in the widest sense is understood that exact guide, rule, or authoritative standard by which a being is moved to action or held back from it. In this sense, we speak of law even in reference to creatures that are incapable of thinking or willing and to inanimate matter.

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[44] - Nasr, Seyyed Hossein, Islam and the Environmental Crisis in *Islam and the Environment*, by Agwan, A.R. (ed.). Malaysia: Genuine Publications & Media Pvt. Ltd., 1997, pp. 15-35.

[45] -Ibid, p. 16.

[46]- Sardar, Ziauddin. Islamic Futures. New York; Mensell Publishing Limited. 1985. p.218.

[47] Ba^{c}albaki, Munir, *Al-Mawrid*. Beirut: Dar El-Ilm Lil Malayen, 1991, p. 315.

In a stricter and more, exact sense law is spoken of only in reference to free beings endowed with reason. In the proper and strict sense laws are the moral norms of action, binding in conscience, set up for a public, self-governing community. This is probably the original meaning of the word *law*, whence it was gradually transformed to the other kinds of laws (natural laws, laws of art). Law can in this sense be defined with St. Thomas Aquinas (Summa Theologica I-II:90:4) as: A regulation in accordance with reason promulgated by the head of a community for the sake of the common welfare.[48]

Therefore, law in the strict sense is imposed upon rational, free beings as a controlling guide for their actions.

Law is first a regulation, i.e. a practical principle, which aims at ordering the actions of the members of the community. To obtain in any community a unified and systematized co-operation of all there must be an authority that has the right to issue binding rules as to the manner in which the members of the community are to act. Not every regulation of the superior, however, is binding, but only those in accordance with reason.

Law is the criterion of reasonable action and must, therefore, itself be reasonable. A law not in accordance with reason is a contradiction. Laws are imposed upon the community as such, in order to guide it to its goal: this goal, however, is the common welfare.

Another condition of law is that it should proceed from the representative of the highest public authority, be this single person, several persons, or finally the totality of all the members of the community, as in a democracy. Law is a bond imposed upon the subjects by which their will is bound or in some way brought under compulsion about the performance or the omission of definite actions

Ethics

Every people, even the most uncivilized and uncultured, have its own morality or sum of prescriptions, which govern its moral conduct. Nature had so provided that each man establishes for himself a code of moral concepts and principles, which are applicable to the details of practical life.

Ethics takes its origin from the empirical fact that certain general principles and concepts of the moral order are common to all people at all times. This fact has indeed been frequently disputed, but recent ethnological research has placed it beyond the possibility of doubt. All nations distinguish between what is good and what is bad, between good men and bad men, between virtue and vice; they are all agreed in this: that the good is worth striving for, and that evil must be shunned, that the one deserves praise, the other, blame. Though in individual cases they may not be one in denominating the same thing good or evil, they are nevertheless agreed as to the general principle, that good is to be done and evil avoided.

[48] - Catholic encyclopedia, law.

For as long as people have been living together in communities, a moral regulation of behavior has been necessary to the community's well being. We call it ethics, which can have several meanings. It could be a discipline, which deals with what we define as good and bad and with moral duty and obligation. It could be a set of moral principles or values or a theory or system of moral values.[49]

On one hand, ethics refers to well based standards of right and wrong that prescribe what humans ought to do, usually in terms of rights, obligations, benefits to society, fairness, or specific virtues.[50] On the other hand, it refers to the study and development of one's ethical standards. Ethics also means, then, the continuous effort of studying our own moral beliefs and our moral conduct, and striving to ensure that we, and the institutions we help to shape, live up to standards that are reasonable and solidly based.[51]

In Islamic culture, ethics are termed '*akhlak*' or *'khuluk'* (the plural form) or 'innate disposition'.[52]
The Arabic word *Akhlaq* is the plural of *Khulq* and signifies the character traits of a person. It is related to *Khulq* in the sense that the character traits of a person result from the way that the person has been formed or molded.[53]
In contemporary usage, the word *Akhlaq* is used to translate the English ethics. The English word ethics is ambiguous, since it is used both for that branch of philosophy that studies values, principles and virtues and for these values, principles and virtues themselves.

[49] - Depending on the social setting, the authority invoked for good conduct could be the will of a deity, the pattern of nature, or the rule of reason. When the will of a deity is the authority, obedience to the divine commandments, e.g. in scriptural texts, would be the accepted standard of conduct. Needless to say that it is here that Christians and Muslims would consider themselves to belong. But others find other sources of authority in relation to ethics. If the pattern of nature is the authority, conformity to the qualities attributed to human nature is the standard. When reason rules, moral behaviour is expected to result from rational thought.
[50]- Ethics, for example, refers to those standards that impose reasonable obligations to refrain from rape, stealing, murder, assault, slander, and fraud. Ethical standards also include those that enjoin virtues of honesty, compassion, and loyalty. In addition, ethical standards include standards, where the focus is on basic human needs.
[51] - Little,D, "Ethics" in Dictionary of Living Religions, edition by Keith Crim, Nashville,U.S.A, 1981, p. 240.
[52] Walzer, R., "Akhlak" in *The Encyclopaedia of Islam New Edition*, vol 1 by H.A.R. Gibb (et.al.). Leiden: E.J. Brill, 1960, p. 325.
[53] - Shaafi'I Mazandarani, Mohammad, Islamic Ethics, Tehran, 1372 (A.H.), pp.15-38.

According to Islamic terminology, ethics is a state, *hay'a*, which resides in human souls.[54] All voluntary actions, be they good or bad, beautiful or ugly, are based upon it. This state is influenced by upbringing, which can infuse the perception and admiration of virtue. The continuation of a beneficial upbringing usually leads this *hay'a* to the love of good and the hatred of evil. The Arabic terminology for this is *khuluq hasan* or good ethics. Bad upbringing or bad ethics, *akhlaq sayī'a*, would result in the converse. Indeed, Islam strongly recommends good ethics just as it denounces the bad.[55] Islamic ethics are founded on two principles: firstly human nature, and secondly religious and legal grounds.[56] The former principle refers to the natural instinct, also called *fitrah*, which was imprinted in the human soul by God at the time of creation. The Qur'an states,

And by *Nafs* (Adam or a person or a soul etc.), and Him Who perfected him in proportion; Then He showed him what is wrong for him and what is right for him.' (Ash-Shams, 91: 7-8)

The verse clearly indicates that by having innate instinct, man can differentiate not only between good and bad, but also between these and that which is neutral, neither good nor bad. However, natural instinct may be affected by external influences such as customs and personal interests, which can cloud the ability to choose between good and evil. Therefore, the second principle, based on religious and legal grounds, has a vital role to play in ensuring that the individual is disposed towards ethics.
One area in which ethics has always played an important role is environment.

Environmental law

Environmental law is a body of law, which is a system of complex and interlocking statutes, common law, treaties, conventions, regulations and policies which seek to protect the natural environment, which may be affected, impacted or endangered by human activities. Some environmental laws regulate the quantity and nature of impacts of human activities. Other environmental laws are preventive in nature and seek to assess the possible impacts before the human activities can occur. Environmental law is used to describe the vast realm of law, largely statutory in basis that addresses human actions affecting the rest of the natural world. Thus, it includes both the area sometimes termed natural resources law and pollution control law. Environmental law was developed in response to the public perception that human health and the environment were inadequately protected. Clearly, our environmental laws promote a valuing of the environment among other things.

[54]- Izzi Dien, Mawil, Islamic Ethics and the Environment in *Islam and Ecology* by Khalid, Fazlun and O'Brien, Joanne (ed.). GB: Cassell Publishers Limited, 1992, p. 25.
[55]- Ibid.
[56] Izzi Dien, Mawil, Islamic Environmental Ethics: Law and Society in *Ethics of Environment and Development*, ed. by Engel, J. Ronald and Engel, Joan Gibb. London: Belhaven Press, 1990, p. 191.

Environmental ethics

Respect for life demands an ethic concerned about human welfare, like the others and now concerning the environment. However, environmental ethics in a deeper sense stands on a frontier, as radically theoretical as it is applied. Alone, it asks whether there can be nonhuman objects of duty.[57]

In practice, the ultimate challenge of environmental ethics is the conservation of life on Earth. The call for a 'basic change of values' in connection to the environment (a call that could be interpreted in terms of either instrumental or intrinsic values) reflected a need for the development of environmental ethics as a new sub-discipline of philosophy. Environmental ethics seeks to escape relativism in ethics, to discover a way past culturally based ethics.

All the moral duties we have towards the environment are derived from our direct duties to its human inhabitants. The practical purpose of environmental ethics is to provide moral grounds for social policies aimed at protecting the environment and remedying environmental degradation.

Relationship between law and ethics

Various questions have been raised about the relationship between law and ethics. These questions arise from the fact that both law and ethics seem to have a certain sort of autonomy or independence.

If law and ethics are viewed narrowly-law as rules of conduct promulgated and enforced by political authorities, and Morality as a way of regulating the conduct of human affairs and relations between persons in communities-the two may be treated as largely independent of each other, at least in most cultures. If, however, each is viewed more broadly, they will be seen to be closely interrelated. In virtually all societies, the established legal processes of allocating rights and duties, resolving conflicts, and creating channels of cooperation are inevitably connected with the community's sense of, and commitment to, ultimate values and purposes.[58]

Environmental protection depends in large measure on the cooperation and contribution of the people of the world. Governments must promote and encourage this, and have the responsibility to set and enforce rules.

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[57] - Rolston, Holmes, "Environmental Ethics: Values in and Duties to the Natural World" in The Broken Circle: Ecology, Economics, Ethics, ed. by F. Herbert Bormann and Stephen R. Kellert, Yale University Press, New Haven 1991.

[58]- But being ethical is also not the same as following the law. The law often incorporates ethical standards to which most citizens subscribe. But laws, like feelings, can deviate from what is ethical. For instance history knows of societies and their laws, which legalized slavery.

However, we can say that the environmental crisis faced by many developed and developing countries is in effect a moral one and the conservation of the natural environment is a moral and ethical imperative.

There is a wide variety of means available for the enforcement of environmental laws. One of them is ethics. Environmental law cannot and will not succeed unless there is strong public commitment to conserving non-human nature. Therefore, environmental law will not endure or have lasting effect unless it does indeed base upon environmental ethics successfully.

Environmental problems cannot be solved through knowledge and technology alone. Enlightened self-interest does not motivate people to do more than is convenient and profitable for themselves. Only moral conviction and ethical consciousness - on both individual and social levels - can motivate people to forego some of the short-range profits of this life, and to make personal sacrifices for the common good. It is only when our ethical horizons extend to embrace not only humankind but also all generations and all created beings, that we can perform the noble role in protection of environment.

An important challenge for those working at the intersection of environmental law and ethics is to identify the values we embrace today through our laws. Knowing the values we are pursuing as a society is essential to any serious debate about reforming our law. A clearer sense of the values that dominate our laws and policies today may foster more serious thought about the values we want to protect and why. Therefore, if the environmental law has ethical value it will be acceptable for people.

The protection and conservation of the environment and natural resources involves two major aspects: Remedy of damage; and Prevention of damage.

-The governing authorities have the obligation to take all necessary measures and actions associated with the elimination of existing damage, repair of its effects, and provision of indemnity for it in application of the relevant principles of law. The governing authorities have, for instance, the right to hold individuals, organizations, establishments, and companies responsible for the elimination and repair of damage resulting from their activities, enterprises, and projects, which, although needed for the welfare of the whole community, may result in damage to the environment and the natural resources. The legal rules in this regard are, "Damage shall be eliminated," and "Damage shall be removed to the extent that is possible."

-The governing authorities have the obligation to take all necessary measures and actions to avoid, prevent, or minimize damage before it occurs in application of the principle "There shall be no damage and no infliction of damage," and the juristic method of obstructing outwardly legitimate means which may serve as pretexts for illegitimate ends.

In legislation, all acts must be evaluated in terms of their consequences as social goods and benefits and social detriments and evils. Planners, designers, and administrators must always aim at the universal common good of all created beings. This means that they must strive to harmonize and fulfill all interests. However, when it is impossible to satisfy all immediate interests, the universal common good requires evaluation and prioritization by weighing the welfare of the greatest number, the importance and urgency of the various interests involved, the certainty or probability of benefit or injury, and the ability of those affected to secure their interests without assistance.

The ultimate objective of law must be the universal common good of all created beings. This objective of the universal common good means that no species or generation may be excluded from consideration in the course of planning and administration, but that each individual as well as the community must honestly strive toward the welfare of the whole. The protection, conservation, and development of the environment and natural resources is a mandatory ethical duty to which every one should be committed.

It is now almost taken for granted that people will not observe the environmental laws if they do not commit to it morally. It is evident that one has an ethical obligation to protest against laws that are judged unethical. The assumption that our environmental laws are reasonable standards of actions in the sense that they reflect moral values and advantageous to the common welfare cause that people accept them and observe it readily.

Conclusion

Conclude, the ecological crisis faced by many developed and developing countries is in effect a moral one. It is believed, therefore, that it demands moral solution and the process of an ethic of 'decision-action' can deal with the crisis effectively. Environmental laws include a vast variety of legislation, which is, in some way, concerned with the control of environmental damage. There is a wide variety of means available for the enforcement of environmental laws. One of them is ethics. Environmental law cannot and will not succeed unless there is strong public commitment to conserving non-human nature. Therefore, environmental law will not endure or have lasting effect unless it does indeed base upon environmental ethics. Because law functions as a system of externally imposed constraints on behavior, whereas ethics functions as self-imposed constraints. In legislation, all acts must be evaluated in terms of their consequences as social goods and benefits and social detriments and evils. Planners, designers, and administrators must always aim at the universal common good of all created beings. They must know that we inhabit in the environment. Hence, we cannot poison it without poisoning ourselves. On the other hand, preserving environment helps promote human happiness and flourishing.

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ASSESSING ENVIRONMENTAL IMPACT ASSESSMENT - AN INDIAN CRITIQUE

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The research paper attempts to review and criticise the recent amendments to the Environmental Impact Assessment (EIA) law in India. It briefly discusses the major aspects of the EIA law and then goes on to highlight the shortcomings of the law and the negligence on the part of the government towards the environment meant to promote the investment and thus the economic growth. It attempts to throw light on various aspects like public hearings with the local communities, clearance mechanisms, influence of the organisations calling for these assessment in manipulating results etc.. The paper expresses concern over various other provisions in the current notification which are defeating the very purpose of conducting an EIA, especially those relating to real estate sector. It also highlight a few case-laws and incidents where the laws in this regard. Finally it calls for the international community not only make such assessment mandatory but also prescribe certain essential steps which would have to be mandatorily and uniformly followed in all nations.

Introduction:

The hunger of man for development has made him cause immense damage to the environment without realizing the fact that it would be detrimental to his own interests. He has been erecting those concrete structures without noticing that the life-giving natural environment is being done away with. The speed, scale and character of contemporary technological and economic development, which has permitted material standards of living to reach high levels has also led to unforeseen effects on the very environmental assets that constitute the basis for sustained economic development. However having realized the importance of environment of late, the policy makers came up with the idea of *Environmental Impact Assessment (EIA)* which again flows from the concept of *Precautionary Principle* as has been devised by the international community and followed by the nations individually. Ever since the *Stockholm Conference on Human Environment in 1972*, the EIA has become mandatory for all major developmental projects, which have impacts on environment and people.

However there has been a comprehensive policy-making in this regard which has again invited the ire of the various activist groups which have found it objectionable time and again. The wide application of procedures for the assessment of environmental impact has become a promising instrument to prepare for public decision-making on development action. The purpose of taking up the impact assessment at the inception stage is to ensure that the side, choice of process-technology, selection of appropriate layout and selection of building material is done in such a way that the environmental compatibility is ensured.

Whenever we have large-scale constructions it is important to ensure that a proper *Environment Impact Assessment (EIA)* is done. In India, while it all started in the 1970s to assess the impact of the massive river-valley projects, it has gradually shifted to various developmental sectors like industries, mining, thermal power projects etc.. Now even the Real Estate requires an EIA due to its large-scale impact on environment.

Before we move on to the controversial aspects we need to necessarily have a look at the various essential features, one of which is *Environmental Inventory*, meaning a complete description of the environment, as it exists in an area where the project is proposed. This includes not just the physical environment but also the biological and cultural environment. *Environmental Inventory* serves as the basis for evaluating the potential impacts on the environment, both beneficial and adverse, of the proposed action. In simple terms this being the initial step in the *Environment Impact Assessment*, its significance becomes all the more important.

Coming onto EIA, the major steps can be outlined as, ecosystem evaluation, classifying resources, laying down the project parameters, constituting a technically equipped EIA team, preparing maps and checklists, assessing each project parameter with respect to each type of resource according to its degree of reversibility, quantifying the degenerative effect on the resource and indicating corrective steps where known besides also indicating the areas of uncertainty, which have to be closely monitored. It can be narrowed down further into five categories, namely, the environmental impact of the proposed action, any adverse environmental effects which cannot be avoided should the proposal be implemented, alternatives to the proposed action, the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity and lastly any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. It is very essential that for accomplishment, an EIA should be *interdisciplinary*, *systematic* and *reproducible*. The methods of assessment have to be well-planned and should also consider the minute effects besides the major ones. The entire summary of the EIA is then written in a format prescribed by the Directorate of Environment and then submitted to the same.

The Shift In The Indian Law:

The legal regime with respect to EIA has existed for quite sometime in India. However the latest notification as issued by the Central Government on the 15th of September, 2006 has created quite a stir, with the major non-governmental environmental organisations being extremely critical of the same. The modifications are the result of the recommendations of *The Govindarajan Committee*, which was constituted to examine the procedures for investment approvals and project implementation. One major finding of the above-mentioned committee was that the environment clearance causes maximum delay to projects and recommended that some of the cumbersome procedures be modified.

The notification basically aims at relaxing the rules for obtaining environmental clearance from the Centre. This is the reason as to why the new notification gives concessions to the building and construction sector. Projects will now receive environmental clearance at the Centre and State level depending on the built-up area instead of the cost of the project. Developmental projects with a built-up area of between twenty thousand to one lakh square metres will be given environmental clearance by the State Pollution Control Boards and those with a built-up area of above one lakh square metres will have to approach the Union Environment and Forests Ministry for EIA clearance. The automobile sector, biomedical industries and flyovers will not require environmental clearance from the Centre, but will have to approach the State Pollution Control Boards.

The Criticism

While sources in the Union Environment and Forests Ministry have described the new norms as the most advanced regulatory system where three years of professional work had been put in, it has evoked sharp reaction from environmental groups, who alleged that the new norms benefited the construction sector. They have argued that the environmental groups, panchayats and other stakeholders had not been consulted before the new norms were drafted. Only the industry was taken into confidence, they alleged. Several non-governmental organisations have written to the Prime Minister about this and expressed their concern over the methodology adopted by the Ministry in drafting the new notification. The ministry however argues that the same has been done to prevent time-lapse and make the clearance procedure more efficient and effective.

While the notification makes a distinction between the projects to be cleared by the Centre and States respectively, there is no mechanism of counter-check which means that the chances of irregularities are the maximum. Again the modification makes the project management to file a mandatory compliance report every six months. However considering that there are just three members in the State Committee it would be difficult to verify them properly. There is no reason as to why a social impact assessment expert should be excluded from the EIA expert committee as that would be detrimental to the assessment of the social costs, which holds immense importance these days.

Noticeable however is the fact that the present notification does not talk about any EIA adherence for construction projects below 20, 000 sq, meters. It has failed to realize that if a construction is done over such area, in an ecologically fragile zone, it is sufficient to cause considerable irreversible damage. May be the government has forgotten the very fact that making the EIA mandatory for the real estate and construction sector had made it receive commendation from UNEP. Now it is relaxing those very regulations. Again the river valley projects which generate less than 25 MW have been exempted from environmental clearance and public hearing. What they have failed to realize is at a later stage the capacity can always be expanded once the project is set-up. Giving immense regulatory power to the state is detrimental as the state itself sponsors many of the major developmental projects, whose EIA is done.

In addition to all this the buildings and real estate projects have been exempted from public consultation, though there appears no appropriate reason for doing so. This means that the views of the local population, who are best acquainted to a given area being native to it, are being done away with, without realizing that the same can at times prove suicidal. The local population always serves as the best advisor about a given area. Even if the new notification clearly emphasizes on the provision of "*public consultation*" it is important to note that even in the past it has not been followed properly. Also there is the clause which surprisingly empowers the regulatory authority to do away with the public hearing.

Initially it was in the year 1997 that the notification on EIA was amended to make public hearing mandatory before a project is cleared. The purpose was to provide the only forum for the local residents and concerned groups to come face to face with project proponents and government authorities and to voice their suggestions and objections. It is important that the local communities are heard as that is the very essence of the purpose of having such a provision. If it is done away with even in the smaller projects or if it does not have any

binding value which means, if it is not obligatory to incorporate the suggestions made in a public hearing, it is absolutely essential that such a provision is done away as it would not be serving any purpose in such a case.

There are numerous instances where the MoEF has never heard the suggestions of the local communities or given appropriate reasons for having ignored them, which is not only against the environmental norms but also against the principles of natural justice. Noticeable among them have been the oppositions in the cases of the Bodhghat hydel-project, the prototype fast-breeder reactor at Kalpakkam, the uranium prospecting on the borders of the Nagarjunasagar - Srisailam Tiger Reserve etc., which never got to hear even the MoEF's reasons for clearing the project, overruling their collective opinion.

In the past too there are instances of the dams being constructed or proposed without proper adherence to the EIA norms or without proper consideration of the effect on environment. The pristine forests in Uttara Kannada district of Karnataka, for example, will face serious danger and thus cause immense harm to even the animal population specially the elephants, thus even effecting their population. It is believed that if the independent power producer Murdeshwar Power Corporation (MPC) has its way, an area of 210 hectares, including evergreen and semi-evergreen forests, will be submerged for the sake of the Rs.180-crore Dandeli Mini Hydel Power Project. Therefore there should be a proper EIA done in such cases where the impact is of such high magnitude and also were the EIA done in the past have been found to be defective. They must check such activities or it will also face he threat the beautiful Tiger Leaping Gorge faces in China. But the authorities seem to be adamant about ignoring the damage to the environment and going ahead with the disastrous project.

In the case of the proposed Sethusamudram Ship Canal Project, even though the EIA conducted by the National Environmental Engineering Research Institute (NEERI), Nagpur, acknowledges that the Gulf of Mannar and the Palk Bay are "*biologically rich and rated among the most highly productive seas of the world"* they have themselves not mentioned about the ecological destruction that would be caused to the proposed project. The Gulf of Mannar Biosphere Reserve, which is a unique marine reserve, shall be lost forever. It is surprising as to how they have failed to realize that the physical environment affects the biological environment and any kind of blasting or dredging in such an ecologically fragile area would destroy the entire marine eco-system. If such aspects of extreme ecological importance are not considered there is no reason as to why the EIA should even be conducted.

There have not been many cases regarding EIA that have come before the Indian courts of law, but then the Supreme Court and in some cases the High Courts has been instrumental in ensuring that the law is properly applied and at the same time neither misused nor relaxed. There have been cases like the Badkal and Surajkund lake case, the Aquaculture case, the Bombay Mills case, the cases of Tehri Dam and Silent Valley etc., where the importance of EIA has been emphasized in more ways than one. But in spite of all this the law has been modified 15 times in 12 years ever since it was given effect to in 1994. This shows that there is quite a bit of instability still existing, which has to be done away permanently.

Conclusion

Even though the notification related to EIA is mandatory there are numerous reasons as to why it is not effective. Firstly, many of the guidelines for EIAs are impractical and improper as has been pointed out earlier. Secondly, the requisite expertise to carry out professional EIAs is inadequate or not easily available. Thirdly, the most dangerous aspect is that the EIAs are funded by those very people who are proposing the project thus reducing the impartiality of the project-assessment and making it totally biased. The severe lack of public involvement and non-availability of the full EIA document to the public, are other critical problems. While NGOs and local residents have used public hearings as a forum to raise the lacunae and loopholes in the existing EIAs, the government is under no obligation to incorporate the objections raised in such a hearing. Sometimes, despite serious objections by residents and NGOs along with evidence of negative impacts, projects have been granted clearance like in the case of a barge-mounted power plant in Dakshin Kannada district of Karnataka besides others.

The situation has reached such a stage where the non-governmental organisations have even tried launching a "*Dilli Chalo*" to challenge the MoEF's proposed reforms on environmental clearance, which they feel are nothing but opening the environment to the corporate sector. They feel that the present notification issued on 15th September, 2006 again has been issued in reliance on World Bank and foreign consultants. They feel even the draft National Environmental Policy (NEP) 2004 has serious dilutions in the EIA and the Coastal Regulation Zone Rules.

What we seem to have failed to realize is the fact that, any damage to basic resources would be life-threatening, any damage to the developmental resources would retard economic development and that to the cultural resources would deprive us of aesthetic and spiritual joys. We need to realize this as soon as possible as we already suffer from palpitation considering that our heart lies in the environment. The environmental legislations in India have four major governing principles, namely, polluter pays, precautionary principle, prevention at source and extended producers' responsibility. The Parliament has to keep this in mind. What it is failing to realize that in order to achieve the required economic growth it is adversely affecting its resources which in turn would hamper long-term progress.

This being one such instance, it is important that the international community take notice of such irregularities and try and convince the nations to apply the law properly. By doing that it would not be affecting the sovereignty of any nation but would definitely try and ensure that any country like India makes laws and initiates developmental plans in consultation with the people as ultimately all laws are meant for their welfare. The nations of the world should realize that the prosperity lies not only in economic development but also in restoring and treasuring the natural wealth as well, the beautiful nature. Till the nations do not realize this there is no point of having international summits and conventions to protect the environment as it would not serve the purpose in any way.

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PROCEEDINGS

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MT-10: Environmental Organizations: Roles, Problems and Prospects

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HOW THE ENVIRONMENTAL PROFESSIONALS IN TURKEY PERCEIVE THE "ENVIRONMENT" AND ACT?

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This study analyzes the environmental knowledge, attitudes and environmentally significant behaviors of the environmental professionals such as academicians and higher level of bureaucrats in Turkey. Additionally socio-demographic characteristics of target groups were measured to examine if environmental professionals having environmental knowledge and defending eco-centric or at least homocentric approaches do really reflect their attitudes and knowledge into actual behaviors or a paradox arises when actual behaviors are compared with expressed beliefs and attitudes. It was found that, socio-demographic characteristics such as gender, age and education were not show statistically significant difference at the respondents' behavior. There only exist a positive relationship between education and environmental knowledge. Additionally, the data herein supports the theoretical assumption that, distinct professional groups have different environmental ethical approaches and different levels of environmental knowledge. Academicians have the highest consciousness level of environmental knowledge. Finally the most striking result is; although respondents have at least moderate level of environmental knowledge; there exist a statistically significant negative correlation between respondents' environmental knowledge and their behavior.

Introduction

Nowadays as people are facing with destruction of natural resources, global warming, decrease in biodiversity, ozone layer depletion, accelerated rates of land degradation, desertification and have begun to feel the consequences of these problems heavily, the approaches to man-nature interaction and environmental perception have changed and developed from the mid 20th century to today. Depending on that fact, the understanding of "environment" is changed and context is expanded including man-nature mutual relationship. A transition is realized from a mechanical view that accepts man as the lord of the universe and nature can be exploited for human benefit to a more organic, functional or holistic approach that accepts, everything is connected to everything else.

Because of this increased sensitivity to environmental changes, a great number of people became an "environmentalist". Especially in Turkey, the number of people who are interested in environmental issues has increased and being environmentalist became a trendy fashion, mostly for intellectual groups. Conservation organizations and environmental NGOs are now receiving more calls, individuals especially businessmen are being a member of these organizations and offering help who never previously demonstrated an interest to the environment, "environmental policies" take part in the programs of political parties, several legislation on environmental issues have been declared by decision makers, environmental groups such as Greenpeace, represent an important channel for the public to express their concerns and so on.

These changes seem to indicate that people are becoming aware of the importance of nature and environment and thus their responsibilities towards environment. It might be expected that, environmental consciousness should increase and attitudes towards the environment should change resulting in changes in behavior for better environmental conditions or at least betterment of present environmental problems. However, environmental problems still exist; ozone layer is still depleted, biodiversity is decreasing, terrestrial lands getting smaller since lowlands are begin to covered by water.

It is clear that; to be an environmentalist might not be enough to protect the environment or to prevent environmental problems by today's way of perception of nature and man-nature relations. People do not incorporate these changes in attitudes, in perception and environmental consciousness into their daily routine lives. They do not live in an environmentally friendly way, they do not change their consumption habits and they do not take care of environmental values in their relations with each other and with nature. If there is conflict between personal interest and protection of nature; unfortunately personal interest gains the priority. This situation makes us question- is there "hypocrisy" or not? If there is an inconsistency between environmental attitudes and behaviors, this will create a great problem. In such a situation solution of environmental problems will be more difficult than expected. Therefore this dilemma certainly required to discuss the need for a mechanism to change the code of behavior and set of values which are internalized and adopted to guide their actions by the individuals. That is, there is a need for effective ethical values haven by individuals in spite of interests world of capitalism. These values being different than the laws are informal and unwritten value based conduct of the individuals towards environment. In other words, "internalized ethical values" necessary to make individuals behave in a real environment friendly way by feeling themselves as the part of it and feeling nature inside themselves.

To make these problems clear, it certainly is necessary to examine the inconsistency (if exists) between, what people's perception of being "environmentalist", their environmental approaches and how to adopt their environmental attitudes into behaviors or actions. Therefore by this study it is aimed to measure people's attitudes and behaviors towards environment.

Methodology

Construction of Questionnaire

To measure and capture how individuals view environmental issues and form preferences for behavior mostly questionnaires are used which are prepared according to either known and accepted scales or newly formed scales for specific purposes (Stern, Dietz, Kalof, 1995). These scales are necessary to be able to validly and reliably measure people's belief and value systems. In the present study, Dunlap and van Liere's modified "New Environmental Paradigm" (NEP) scale was selected among other known scales since it emphasized environmental protection, limited industrial growth and population control among other issues that fits the approaches in this study. It has become more widely used measure of environmental or ecological worldview challenging the older view of anthropocentric approach. Additionally, several studies (La Trobe, et al., 2000) done to elaborate such measuring instruments has shown that; it is possible by applying NEP scale to include references to the intrinsic value of nature, as well as the moral duties people have to the rest of nature and to other human beings, with a considerable reliability that perfectly matches the

requirement of the present study. The basic assumption of the NEP is that humans are equal members of the natural world rather than being distinct from nature and exempt from natural laws. All of those specifications of NEP scale are satisfactorily enough to be used for the purposes of this study. Although its dimensionality found different for different studies (even one-dimensional), generally it has three distinct dimensions; limits to growth, man over nature and balance of nature. All of these dimensions are one to one corresponds to the environmental approaches discussed and accepted as mainframe of this study. NEP items measuring these three facets of new social worldview exhibited a good deal of internal consistency and strongly discriminated between known environmentalists and the general public.

To measure individuals' ethical values related with their attitudes towards nature, Merchant's classification of environmentalism will be taken as basis since it fits best to the aims of this study. Three main approaches take place in her classification; "egocentrism", "ecocentrism" and "homocentrism" and all of them are necessary to measure for the purpose of this study. She places "homocentrism" between two extremes of "egocentrism" and "ecocentrism" that has both mechanistic and holistic view and becoming trendier nowadays.

Selection of Target Groups

Although we are willing to include all layers of society in this study; it is impossible to manage this in the context of this study. Therefore depending on the above specification of the NEP, as a target group environmental academicians who are employed in universities and work with environmental issues (biology, environmental engineering, water products engineering, agricultural engineering, etc), bureaucrats (especially those in decision-making positions) were chosen as a representative of known environmentalists and randomly selected people who graduated from university and share a similar income level with the other groups and have no direct relation with environmental issues were chosen as a representative of the general public for the purposes of this study. Another reason for choosing these particular groups of respondents is; academicians and decision makers are expected to exhibit their environmental attitudes in their behaviors since they are the most conscious people on environmental issues in Turkey and in the World. To handle environmental problems created by human activities and to avoid creating new ones, we need national and international standards, produced in the light of ethical value knowledge by ethically-concerned professional *scientists and academicians.* To make these standards applicable, we need ethically concerned *decision makers*. However, being ethical is not enough; environmental or ecological knowledge and consciousness are necessary. We need academicians and decision makers who can connect this knowledge with ethical values to solve environmental problems in given situations and have a capacity to evaluate each case for itself. Additionally, the *academicians* are very important since, they as a group are highly influential in shaping the environmental attitudes of future generations. The third group was involved in the study to make reliable comparisons between environmental specialists and (laymen) ordinary people who are well educated.

After decision of the target groups, for the determination of sample population, firstly a list of departments dealing with environmental issues (departments of environmental engineering, biology, geography, faculties of water products, centers for environmental research and application, centers for urban and environmental sciences, geography, etc.) was established and about 90 departments were finally taken as the sample population. Similarly, environment-related governmental institutions and their different departments were investigated via the Internet and approximately 80 different organizations and related departments were found.

Data Collection

Depending on the above explanations 90 individuals for each target group and a total of 270 questionnaires were distributed to the respondents via e-mail and direct contact. A total of 198 questionnaires were returned, with a response rate of 73.33%. Only three questionnaires were not fully completed and were thus not incorporated into the analysis stage of the study.

Data Analysis

In this study, Statistical Package for Social Science (SPSS 11.5 for Windows) was used as a statistical program to summarize and analyze the data throughout the entire procedure. Both descriptive and inferential statistics were utilized for the analyses.

Results and Discussion

Interpretation of Socio-demographic Characteristics of Respondents

One of the ways social scientists can promote environmentalism is to understand the relationship between demographic variables and environmental attitudes and behaviors (Scott and Willis, 1994). Depending on that fact, numerous studies have examined the associations between socio-demographic characteristics and environmental attitude, knowledge and environmentally significant behavior. These studies reveal that some factors are more consistently related to environmental behavior over time than the other. Findings of those studies might be summarized as; although young age and higher education were generally agreed on in describing the characteristics of environmentally sound people- in most of the research, highly educated respondents are found to have more pro-environmentalist values than the lower educated respondents- conclusions based on other demographic parameters were fairly conflicting (Arcury, 1990; Stern et al.,1993; Tarrant and Cordel, 1997; Zelezny et al, 2000). It is difficult to have a general conclusion.

Along this line to measure the relationships between socio-demographic variables and environmental attitudes, knowledge and behavior; age of respondents, their education, gender, income and professional experiences were asked in the questionnaire in this study. The gender of the respondents was 95 males (48%) and 103 females (52%). The distribution of respondents' ages for the stated interval is more or less the same and distributed around 25%. Since majority of the respondents (95%) have graduated from university, therefore, education of respondents is given in two categories; undergraduate with a ratio of 49% and graduate 51%. The distribution of professional experiences of respondents as such that, most (79% in total) of them have working experience more than 6 years.

When the results of socio-demographic parameters in relation to environmentally significant behaviors examined it was found that, gender (see Table 1) and age (see Table 2) were not show statistically significant difference at the respondents' attitudes, knowledge and behavior.

Similarly, based on the findings of this study, education (Table 1) is not supported as a significant mediator of the environmental behavior. There is no statistically significant relationship between education and environmental behavior. However, as it is our hypothesized; well-educated persons are expected to have a higher level of environmental knowledge; a negative relationship ($t = -3.170$; $p<0.01$) is found between education and environmental knowledge. This might be explained by the contradictory (tricky) nature of the items measuring environmental knowledge.

Moreover, education based results indicate positive relationship ($t = 2.119$; $p<0.01$) between education and ecocentric approaches in accordance with our hypothesis. However, there exist statistically significant difference ($t = 2.524$; $p<0.05$) between education and mechanistic view of homocentrism. Although, when the means are compared, respondents with undergraduate level of education seem more close to homocentrism; there is a confliction between this finding and education-ecocentrism association given above. This might be explained as; well educated people generally have high living standards which they are not willing to give up for a purpose of environmental conservation. Therefore they prefer to support homocentric approaches.

Table 1. T- test Analyses of the Relationships of Education and Gender to the Environmental Attitudes, Knowledge and Behavior

SCALES	Education				Gender			
		N	Mean	t		N	Mean	t
1. Environmental Attitudes (Ethical Values)								
1a)Egocentric limits to growth	Undergraduate	90	3.7007	1.19800	Female	103	3.7235	1.83
	Graduate	93	3.6355		Male	95	3.6257	
1b)Ecocentric nature's balance	Undergraduate	90	2.9447	2.524**	Female	103	2.9447	1,87000
	Graduate	93	2.8012		Male	95	2.8365	
1c)Homocentric mechanistic	Undergraduate	90	2.9580	2.119*	Female	103	2.8867	-.98
	Graduate	93	2.8511		Male	95	2.9376	
1c)Homocentric holistic	Undergraduate	89	3.9912	-.58900	Female	102	3.9814	-1.11800
	Graduate	93	4.0292		Male	95	4.0509	
2.Environmental Knowledge	Undergraduate	90	2.5312	-3.170**	Female	103	2.4853	1.34
	Graduate	93	2.3001		Male	95	2.3862	
3. Behavior	Undergraduate	90	1.3033	-1.34	Female	103	1.3046	-1.12600
	Graduate	93	1.3680		Male	95	1.3573	

Level of significance: * $p<0.05$ ** $p<0.01$ *** $p<0.001$

Table 2. Summary of ANOVA on Environmental Attitudes, Knowledge and Behavior for Age

SCALES		N	Mean	Standard Deviation	F
1.Environmental Attitudes (Ethical Values)	**Age**				
1a)Egocentric "limits to growth"	19 -31	50	3.6514	.33666	.625
	32 -39	54	3.7185	.37221	
	40 -49	50	3.6308	.40047	
	50 +	44	3.7057	.40520	
1b)Ecocentric nature's balance	19 -31	50	2.9910	.41680	2.435
	32 -39	54	2.7814	.41321	
	40 -49	50	2.8870	.29520	
	50 +	44	2.9245	.48176	
1c)Homocentric mechanistic	19 -31	50	2.8818	.33807	2.466
	32 -39	54	2.8244	.35834	
	40 -49	50	2.9442	.33085	
	50 +	44	3.0132	.41715	
1c)Homocentric holistic	19 -31	49	4.0130	.42176	.674
	32 -39	54	4.0819	.44883	
	40 -49	50	3.9663	.44045	
	50 +	44	3.9901	.43965	
2.Environmental Knowledge	19 -31	50	2.5343	.47425	2.090
	32 -39	54	2.2950	.58857	
	40 -49	50	2.4819	.46423	
	50 +	44	2.4529	.52548	
3. Behavior	19 -31	50	1.2925	.28309	1.761
	32 -39	54	1.2697	.36221	
	40 -49	50	1.3705	.33222	
	50 +	44	1.4003	.32309	

Level of significance: * p<0.05 ** p<0.01 *** p<0.001

In addition to common socio-demographic variables such as age, gender and education; professional experiences of respondents was thought as an important variable pertaining to nature of this study. It is expected that, respondents who had experiences with 6-15 years and 16-25 years are more close to ecocentric or holistic approaches and engage their values into their actions. Because they are supposed to both experienced in their works and have ability to follow scientific and technological developments in the world on environmental issues. ANOVA test results of the professional experiences of respondents in relation to attitudinal scale, knowledge and behavior as given in Table 3. The *mechanistic view of homocentric approach scale* was found to significantly associate (F=3.316) with the professional experience. This means, the more the respondents have higher professional experience, the more they are close to anthropocentric worldview. This might be explained as; the older people with higher professional experience in Turkey might not be involved in the new developments and not follow the new approaches on environmental issues in the world. They perform as they used to with their old working habits without applying new trends. Therefore, they might be think of human welfare is the only determinant of nature use and assign themselves as anthropocentric.

Table 3. Summary of ANOVA for Professional Experience on Environmental Attitudes, Knowledge and Behavior for Professional Experience

SCALES		**N**	**Mean**	**Standard Deviation**	**F**	**Multiple Comparisons**
1.Environmental Attitudes (Ethical Values)	**Professional Experience**					
1a)Egocentric "limits to growth"	0 – 5 (A)	41	3.7084	.31222	1.280	
	6 – 15 (B)	60	3.6967	.33580		
	16 - 25 (C)	55	3.5935	.45449		
	25 + (D)	42	3.7254	.37714		
1b)Ecocentric nature's balance	0 – 5 (A)	41	2.9692	.41918	.797	
	6 – 15 (B)	60	2.8486	.43890		
	16 - 25 (C)	55	2.8694	.28246		
	25 + (D)	42	2.9120	.49142		
1c)Homocentric mechanistic	0 – 5 (A)	41	2.9299	.30965	3.316*	
	6 – 15 (B)	60	2.8130	.38026		D*
	16 - 25 (C)	55	2.9066	.30878		
	25 + (D)	42	3.0388	.42544		B*
1c)Homocentric holistic	0 – 5 (A)	41	4.0468	.39758	.902	
	6 – 15 (B)	60	4.0669	.44244		
	16 - 25 (C)	55	3.9395	.44463		
	25 + (D)	42	4.0092	.45567		
2.Environmental Knowledge	0 – 5 (A)	41	2.5510	.48866	1.129	
	6 – 15 (B)	60	2.3592	.57748		
	16 - 25 (C)	55	2.4517	.45665		
	25 + (D)	42	2.4209	.54288		
3. Behavior	0 – 5 (A)	41	1.2669	.29348	2.427	
	6 – 15 (B)	60	1.2722	.32891		
	16 - 25 (C)	55	1.3766	.32330		
	25 + (D)	42	1.4128	.35266		

Level of significance: * $p<0.05$ ** $p<0.01$ *** $p<0.001$

The results indicated that environmentally significant behavior was defined independently of demographic parameters. Only, 'education' was positively related to the ecocentric approach as attitude, whereas surprisingly negatively associated with environmental knowledge. Although 'age' of the respondents was not significantly correlated with any of the items concerning attitude, knowledge and behavior; 'professional experience' was positively correlated with mechanistic view of homocentric approach. As a summary, socio-demographic parameters especially, age and gender are not the particular concern for environmental attitude, knowledge and most importantly for environmental actions within the group of respondents in this study.

Elaboration of Differences Between Professional Groups in Relation to Environmental Attitudes (Ethical Values); Environmental Knowledge and Environmentally Significant Behavior

As can be seen from Table 4 strongly significant differences were found in the mean scores of 'ecocentric approach' and 'environmental knowledge' with respect to professional groups. Apparently, the results explain that, three of the respondents' group differs from each other for 'ecocentrism' (F=7.299) and 'mechanistic view of homocentric approach' (F=5.746). Similarly, as expected, academicians and control group (others) show a strong difference in their mean scores for the scale of 'environmental knowledge' (F=9.147). However, it is surprising that, as opposed to our assumptions, there is no significant difference between the means of all professional groups for environmentally significant behavior. It was expected that - as it is found in the case of environmental knowledge-there exists higher difference especially between academicians and control group in behaving environmentally.

The data herein supports the theoretical assumption that, distinct professional groups have different environmental approaches and different levels of environmental knowledge.

Table 4.Summary of ANOVA on Environmental Attitudes, Knowledge and Behavior by Professional Groups

SCALES		**N**	**Mean**	**Standard Deviation**	**F**	**Multiple Comparisons**
1.Environmental Attitudes (Ethical Values)	**Professional Groups**					
1a)Egocentric "limits to growth"	Academicians (A)	56	3.6205	.31666	1.902	
	Bureaucrats (B)	73	3.6546	.39708		
	Others (C)	69	3.7453	.39628		
1b)Ecocentric nature's balance	Academicians (A)	56	2.7323	.29890	7.299***	B* C**
	Bureaucrats (B)	73	2.9123	.41430		A*
	Others (C)	69	3.0024	.44454		A**
1c)Homocentric mechanistic	Academicians (A)	56	2.7783	.30823	5.746**	B* C**
	Bureaucrats (B)	73	2.9401	.35826		A*
	Others (C)	69	2.9882	.38899		A**
1c)Homocentric holistic	Academicians (A)	56	4.0301	.37366	0.379	
	Bureaucrats (B)	72	4.0383	.50088		
	Others (C)	69	3.9782	.41627		
2.Environmental Knowledge	Academicians (A)	56	2.2344	.49508	9.147***	C***
	Bureaucrats (B)	73	2.4228	.45435		
	Others (C)	69	2.6185	.54983		A***
3. Behavior	Academicians (A)	56	1.4113	.24962	2.608	
	Bureaucrats (B)	73	1.3138	.35836		
	Others (C)	69	1.2809	.34542		

Level of significance: * p<0.05 ** p<0.01 *** p<0.001

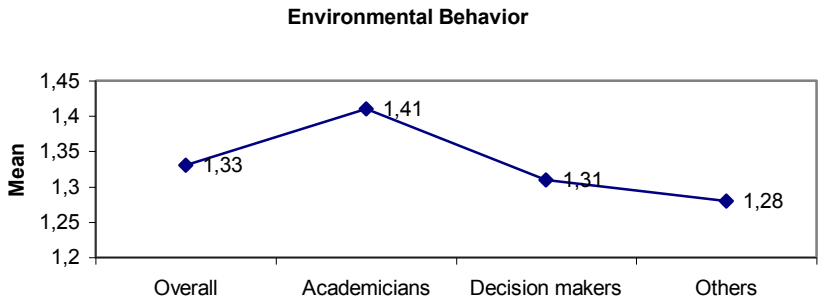
As can be seen from Table 4, strongly significant differences were found in the mean scores of 'ecocentric approach' and 'environmental knowledge' with respect to professional groups. Apparently, the results explain that, three of the respondents' group differs from each other for 'ecocentrism' (F=7.299) and 'mechanistic view of homocentric approach' (F=5.746). Similarly, as expected, academicians and control group (others) show a strong difference in their mean scores for the scale of 'environmental knowledge' (F=9.147). However, it is surprising that, as opposed to our assumptions, there is no significant difference between the means of all professional groups for environmentally significant behavior. It was expected that - as it is found in the case of environmental knowledge-there exists higher difference especially between academicians and control group in behaving environmentally.

The data herein supports the theoretical assumption that, distinct professional groups have different environmental approaches and different levels of environmental knowledge.

Table 5. Descriptive Analysis of Target Groups in Percentages for Environmentally Significant Behavior

Environmental Behavior	**Mean**	**Standard Deviation**	**Min**	**Max**	**Yes (%)**	**Sometimes (%)**	**No (%)**
Overall	1.33	0.33	0.55	1.91	55.6	41.4	3.0
Academicians	1.41	0.25	0.82	1.91	71.4	28.6	-
Decision makers	1.31	0.36	0.55	1.91	54.8	39.7	5.5
Others	1.28	0.35	0.55	1.91	43.5	53.6	29

Figure 1.



One of the purposes of this study was to differentiate the environmental behaviors of studied professional groups and environmental academicians are expected to show highest tendency for environmentally sound behaviors among the other groups. When Table 5 is examined, the proportion of respondents who are regularly engaged in each behavior is moderate with mean of 1.33 (55.6 %).

Academicians are the most environmentally behaving group with the highest percentage (71.4%) while 'others' have the lowest ratio (43.5%) as expected. The reason might be explained in terms of Rolston's (1991) approach; basic knowledge of biology and ecology leads people to behave in an environmentally sound way. Golley (1994) agreed upon that too; "there is an ecological science a crude form of self correction that provides a foundation of common experience from which we can reason towards ethical rules for environmental behavior." Recognition of forests, lakes, deserts, etc. helps us to understand that they reserve respect and moral consideration. That is, ecological science is a foundation for a global and local environmental ethics. In such a case, the concept of environmental ethics that leads individuals to behave environmentally significant way become a concrete concept based on scientific data and facts instead of being "abstract" concept. Therefore it is normal for academicians to be the most environmentally behaving group with the highest percentage.

Table 6 Correlation Matrix of the Scales Between Environmental Attitudes; Environmental Knowledge and Environmentally Significant Behavior

		Environmental Knowledge			Environmentally Significant Behavior		
		Academicians	Decision makers	Others	Academicians	Decision makers	Others
1a)Egocentric Approach (limits to growth)	Pearson Correlation	-.094	-.149	.001	-.220	-.048	.050
	Sig. (2-tailed)	.491	.209	.994	.104	.685	.681
	N	56	73	69	56	73	69
1b)Ecocentric Approach (Nature has a delicate balance)	Pearson Correlation	.469(**)	.539(**)	.596(**)	-.224	-.214	-.192
	Sig. (2-tailed)	.000	.000	.000	.097	.069	.113
	N	56	73	69	56	73	69
1c.1)Homocentric Approach (Mechanistic view; man over nature)	Pearson Correlation	.486(**)	.642(**)	.581(**)	-.239	.092	-.177
	Sig. (2-tailed)	.000	.000	.000	.076	.437	.145
	N	56	73	69	56	73	69
1c.2)Homocentric Approach (Holistic view; human beings threaten the nature)	Pearson Correlation	-.253	-.500	-.412(**)	-.054	.059	-.177
	Sig. (2-tailed)	.060	.000	.000	.691	.620	.146
	N	56	72	69	56	72	69
2.Environmental Knowledge	Pearson Correlation	1	1	1	-.240	-.079	-.289(**)
	Sig. (2-tailed)	.	.	.	.075	.508	.016
	N	56	69	69	56	69	69
3.Environmentally Significant Behavior	Pearson Correlation	-.240	-.079	-.289(**)	1	1	1
	Sig. (2-tailed)	.075	.508	.016	.	.	.
	N	56	69	69	56	69	69

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

As shown in Tables 6, the matrix of correlations illustrates a moderate association between ecocentric approach and environmental knowledge ($r = .469$; $p<0.01$) for academicians; substantial correlation ($r = .539$; $p<0.01$) for bureaucrats and substantial correlation ($r = .596$; $p<0.01$) for others. The data herein supports the assumption that the more the individuals know about environmental issues the higher the consciousness about nature are judged as producing ecocentric approaches or it could also be explained in the inverse. However, considering the target groups; it could be concluded that, there is no significant differences among the groups.

Additionally the results indicate that, there is a statistically significant positive correlation, for all three groups of respondents, between mechanistic view of homocentric approach and environmental knowledge as opposed to assumptions given in the context of this study. The matrix also illustrates a negative association between holistic view of homocentrism and environmental knowledge for "others". This group is chosen as a control group and it is not expected them to have higher level of environmental knowledge. Therefore this negative relationship might be explained in terms of their lack of knowledge on environmental issues, thus their conflicting responses to the questionnaire.

Finally, Table 6 displays the statistically significant correlation between environmental knowledge and environmental behavior for the control group. The details of environmental attitude and behavior relationship were discussed several times for different aspects since it is the major concern of this study. Therefore, it might not be surprising that the most unconscious group's behaviors show inconsistency with their environmental knowledge. However, the accuracy of control groups' answers to environmental knowledge questions should be discussed.

Conclusion

As a result of this study, it was found that, socio-demographic characteristics such as gender, age and education were not show statistically significant difference at the respondents' behavior. There only exist a positive relationship between education and environmental knowledge. Additionally, the data herein supports the theoretical assumption that, distinct professional groups have different environmental ethical approaches and different levels of environmental knowledge. Academicians have the highest consciousness level of environmental knowledge. The most striking result is; although respondents have at least moderate level of environmental knowledge; there exist a statistically significant negative correlation between respondents' environmental knowledge and their behavior. However, the difference of the environmental behaviors of studied professional groups showed that, environmental professionals are the most environmentally behaving group with the highest percentage (71.4%) while control group have the lowest ratio (43.5%) as expected.

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THE ROLE OF NON GOVERNMENTAL ORGANIZATIONS IN REALIZATION OF SUSTAINABLE DEVELOPMENT: TURKISH CASE*

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The concepts of environment and development, which were considered separately until 1970s, have combined in the concept of "sustainable development" with the report entitled "Our Common Future" in 1987 and with 'Local Agenda 21' in 1992. Sustainable development contains future generations and long-term development, improvement of life quality, social and ethical dimensions of justice between generations and the human welfare. Sustainable development explains the integration of strategies and programs related with the development which is going to have effect on human welfare and environment over the long term.

For the realization of sustainable development, a consensus in the social structure about the necessity of sustainable development has to be performed and individuals must arrange their lives in accordance these principles. At this point, NGOs have important roles. These roles are: explaining the necessity of sustainable development to individuals, organizing the educative programs and arrangement of actions against the institutions and organizations which act contrary to the principles of sustainable development.

In this study, we will analyze the roles of NGOs in the realization of sustainable development and how much the NGOs can implement these roles. Firstly, we will analyse the dimensions of sustainable development and the present situation in Turkey. Secondly, we will analyze the actions of NGOs for realization of sustainable development in Turkey and their adequacy. Lastly, we will bring out recommendations on realization of sustainable development and improvement of activities of NGOs in Turkey.

INTRODUCTION

The concepts of environment and development, which were considered separately until 1970s, have combined in the concept of "sustainable development" with the report entitled "Our Common Future" in 1987 and with 'Local Agenda 21' in 1992. Sustainable development contains future generations and long-term development, improvement of life quality, social and ethical dimensions of justice between generations and the human welfare. Sustainable development explains the integration of strategies and programs related with the development which is going to have effect on human welfare and environment over the long term.

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In the first part of the study, the concept of sustainable development and sustainable development approaches in Turkey will be discussed. In the second part of the study, we will explicate the importance and the functions of non governmental organizations in realization of sustainable development. Within this framework, we will analyze which roles of NGO's have in realization of sustainable development and how well they bring out these roles. Within this context, sufficiency of NGO facilities in realization of sustainable development in Turkey will be analyzed and suggestions on increasing the efficiency of NGO's will be offered.

1. SUSTAINABLE DEVELOPMENT CONCEPT

The problems on the ecological equilibrium, which appeared as a result of hectic pace of economic growth after the World War II, were discovered and the relations between the environment and development came into scene, in the end of the 1960s. The discussions on the basic principles of sustainable development, however, started in the second half of 1970s. Sustainable development has developed through the history by the following stages.

- 1972 Stockholm Conference
- 1987 Our Common Future Report
- 1992 Rio Summit
- 1997 Rio +5 Summit
- 2002 Johannesburg Summit

Sustainable development is more comprehensive than protection of environment. Sustainable development takes into account coming generations and long term development; and it comprehends improvement of life quality, justice between the generations and social and ethic dimensions of human welfare. Basic understanding in sustainable development is considering the necessities of coming generations, while using the natural resources for the improvement of human welfare and living conditions. Major Fields of action are environment, economy, administrational and institutional structuring and social values. Basic principles of sustainable development, which came to scene after various applications, are livability, life quality, justice, integration, responsibility, accession and authorization; and the circumstances of sustainable development are democracy - participation, long term vision, consistency – stability, determination of priorities, commonly sharing of social and economical costs, education and sensibility, cooperation and governance and giving more importance to quality rather than quantity. (Commission of European Communities ,1990:59)

In the studies and report which concern sustainable development concept, sustainable development and struggle with poverty, equity in the distribution of benefits gained from natural resources, population control and development of environment friendly technologies, are associated directly. Within this context, depending on assumption of possibility for realization of economic growth in an environment friendly perspective, it is broached that developing countries will have significant roles in overcoming environmental problems and preventing poverty and that long term growth age which will bring out reconstruction age should be started. Concepts, such as "sustainable growth" and "ecological sustainability", are also used very often and relatively with each other and with sustainable development concept.

Discussions about sustainable development are intensified on possibility for substitution of capital types and recyclability of environmental effects, objects in order to achieve the goal and equity dimension in distribution of environmental costs between the generations and the members of same generations. "The Sustainable Development Commission" is established within the structure of UN for the appraisal, application and supervision of documents which are adopted in Rio Summit. Within this framework, in Johannesburg of South Africa Republic, between 26th August and 4th September 2002, "World Sustainable Development Summit" was organized to appraise the ten year after Rio and to develop strategies for the future. Johannesburg Summit was organized in order to establish mechanisms which will give possibility to better application of principles adopted in UN Environment and Development Conference (UNCED) in Rio, in 1992. Within this framework, the difficulties in application of sustainable development are emphasized; and future objectives and a work calendar are prepared in the prior subjects such as obviation of poverty, health, education, agriculture, accession to water and protection of environment which are the basic principles of sustainable development. (Yıldırım, Göktürk, 2004:462). An "action program" is prepared within the understanding of sustainable development. In the action program, some decisions and objectives in the following areas are determined: aid for the developing countries for the negative effects of globalization, prevention of poverty, support for the local administration, renewable energy, management of natural resources and sustainable consummation patterns. In the Environmental Sustainability Index, there are 5 basic components and 21 indicators related to these. These are as followings (http://www.yale.edu/esi/ESI2005_Main_Report.pdf)

- Environmental Systems
  - Air Quality
  - Biodiversity
  - Land
  - Water Quality
  - Water Quantity
- Reducing Environmental Stresses
  - Reducing Air Pollution
  - Reducing Ecosystem Stress
  - Reducing Population Pressure
  - Reducing Waste & Consumption Pressures
  - Reducing Water Stres
  - Natural Resource Management
- Reducing Human Vulnerability
  - Environmental Health
  - Basic Human Sustenance
  - Reducing Environment Related Natural Disaster Vulnerability
- Social and Institutional Capacity
  - Environmental Governance
  - Eco-Efficiency
  - Private Sector Responsiveness
  - Science and Technology
- Global Stewardship
  - Participation in International Collaborative Efforts
  - Greenhouse Gas Emissions
  - Reducing Transboundary Environmental Pressures

2. SUSTAINABLE DEVELOPMENT APPROACH IN TURKEY

The first environment policies, in Turkey, were brought out in the 3rd five year development plan and they took on a shape in the 7th five year development plan. The studies on determination of environment policy have always been in interaction with the effects of development policies of the country on the environment. (Egeli,1996:73). Development has been considered as the prior goal, in Turkey. Within this purpose, environment principle was discounted.

The first development plan, which widely approaches the environment fact for the first time, was the 3rd five year plan, in separate part of the 3rd five year plan between the years 1973 and 1977. In the middle program in 1978, environmental problems are handled in a separate part for the first time and some determinations about these problems are carried out. The effects of the United Nations Human Environment Conference in 1972, which was the first environment conference, are seen on this plan. In this era, the basic approach which defines the environmental policies is that the environment policy gives damages to industrialization and development; depending on the assumption that the environmental problems are caused by income scarcity and insufficient use of resources. Another characteristic of this plan is emphasis on the need for an environment institution for the cooperation between the ministries. The 4th five year development plan of the years between 1979 and 1983 admits that the preventive policies should be carried out about the environment and suggests that the environment should be taken in account about industrialization, modernization in agriculture and urbanization. In the era of this plan, Environment Undersecretariat of Prime Ministry was established in 1978 and The Environment Act, No: 2873, was promulgated in 1983. In the 5th five year development plan of the years between 1983 and 1989, the basic principle was not only to eliminate the present pollution and to prevent the possible pollution but also to protect and improve the resources for the coming generations to benefit from. The basic strategy of the 6th five year development plan of the years between 1990 and 1994 is that the basic principle is to provide an administration of natural resources which depends on the sustainable development concept and will give possibility for a continuous economic development by protecting human health and natural equilibrium; and also to leave a natural, physical and social environment, which is adequate for human, to the coming generations. The 7th five year development plan of the years between 1996 and 2000 takes sustainable development as the basic principle and it also takes the basic problem about the environment as an administration problem.

Another important characteristic of this plan is that international obligations take place widely for the first time and also that environment is included in the national income calculations. In accordance with this objective, in the era of the 7th plan, National Environment Strategy and Action Plan (NESAP) were prepared under coordination of the SPO Undersecretariat, with technical support of the Environment Ministry and being financed by the World Bank. It aims to have a complete regard on the subject (Algan,2000:230-231).

The 7th Five Year Development Plan is the first plan which handles the natural resources administration subject with sustainable development approach. On the other hand, in the 8th Five Year Development Plan of the years between 2001 and 2005 emphasizes the sustainable development approach by saying "it is essential that to provide economic and social development by protecting human health, ecological equilibrium, culture, history and esthetic values" (DPT, 2001). In the 9th Five Year Development Plan, about the sustainable development, it is stated that "fast increase of the population and industrialization process is still a pressure component on sustainable use of resources. For the protection of the environment and for prevention of the negative effects on production process, the uncertainty on delegation of functions and authorities could not have been satisfyingly corrected (www.dpt.gov.tr).

The position of Turkey in Environmental Sustainability Index, which is taken in account in determination of environmental sustainability and is related to 21 indicators, is given below.

The position of Turkey in Environmental Sustainability Index through years (from 2002 to 2005)			
	2001	2002	2005
Turkey	70	62	91

When five components, which take place in Environmental Sustainability Index, are appraised one by one, the note of Turkey, according to the data of 2005, is as followings (http://www.yale.edu/esi/b_countryprofiles.pdf);

- Environmental Systems 37
- Reducing Environmental Stresses 51
- Reducing Human Vulnerability 70
- Social and Institutional Capacity 53
- Global Stewardship 25

The causes of Turkey's failure in realization of environmental sustainability are followings (www.tubitak.gov.tr, 10.10.2006);

- Environment protection investments do not have enough resources
- Necessary support for the research and development studies is not given
- Present resources relevant to environment investments are not used adequately and due to their purposes.
- It is not possible to eliminate the old technology which also produce more pollution , very fast,
- There is not satisfactory and trustable data about environment in Turkey.
- New technologies in certain sectors are dependant to other countries.
- There are contradiction and coincidence about institutional authorities and responsibilities.
- Legal structure can not be brought in accordance with international engagements
- Confusion about intellectual interests and profession acknowledge.

- There are not enough substructures, resources, information and liquidity for efficient use of environment administration tools.
- The present legal order is about punishment of polluter after the pollution, instead of promoting the protection.
- Unplanned urbanization and land utilization as a result of uncontrolled population increase and mass moves.
- The implementation of transport policies which give priority to and promote the land transport; instead of railway transport which spends less energy and causes less environment problem.

3. THE ROLE OF NON GOVERNMENTAL ORGANIZATIONS IN SUSTAINABLE DEVELOPMENT APPROACH

Today, it is an undisputable reality that environmental problems reveal as a result of human attitudes and comportments. The mistakes in utilization of natural resources will only be corrected by gaining the qualities of information society. Within this context, NGO's have very important functions in the process of providing the information society. Answers of many questions, such as in topics of better evaluation of resources, utilization of technologies which are in accordance with environment, the responsibilities of state and private sector about social responsibility areas, lay, mostly, in the functions of the NGO's.

The roles of NGO's on the sustainable development scene are older than World Bank, UN or other supranational aid and development institutions. On the other hand, their experience is contemned and they are shunted within the process up to day. The new inclinations of today, which came up with globalization, have shown that they have diversity, plausibility and creativity in a way that the state do not have. They have created a sense of security, by creating a unity with local people whereas the government can not, in under developed countries. In developed countries, NGO's showed a more powerful social sensibility with the growing support of public. They succeeded to reach the points where the governments can not reach, especially in countries where the social policies go bankrupt such as Africa. They provided significant support in environment field, mostly in social problems (Clark,1996:17).

NGO's constrain all political authorities of the modern world, at first in the country which it belongs, for abolition of traditional development methods and establishment of a new development model (Clark,1996:20). When doing this, they go into collaboration with organizations they established among themselves and also use the supranational organizations in order to become power which is binding and is to be taken into consideration. When doing this, it provides monetary resources from the developing economy, at the same time.

Having local or national, or even international dimensions for the NGO's which carry out facilities in environment field helps the sustainable development to be built on firm ground. Because the basic purpose of the organizations which have facilities in environment field is providing social profits, as it is the same for other NGO's. The role of NGO's in making the sustainability a basic and integral component of daily life will be the leadership. Some examples for this role are prevention of growth of nuclear power, creating awareness in climate changes, putting the scarcity of water in the global agenda (Brown,2001:269-271).

Traditional economic models define the development as the economic growth in which the industry and service sectors are preponderant, and accordingly the welfare standard gained (Clark,1996:34). In order to achieve the welfare standard, the management of the human and nature resources in an optimum way is found to be enough. In traditional development methods, externalities are found to be the loans which do not have to be taken into consideration. Pollution and deficiency of the environment is a sad but unavoidable result in the traditional industry culture.

However, today, it is possible to say traditional development model has gone bankrupt. Because, starvation and poverty have not been solved yet and this danger has came up to developed countries starting from the underdeveloped countries. Though many important developments have been procured in production methods and saving possibilities have been improved, starvation became the basic problem of the world because of grievous devastation of the environment. NGO's function at this point and produce alternative development models against traditional development models methods.

Sustainable development concept can be analyzed in three dimensions for the NGO's: economic, environmental and social. The economic dimension includes posing the environmentalist production models, renewable energy sources, giving know-how support in creation of eco-technologies, putting alternative economic activities into agenda such as eco-tourism, eco-information, presenting rural or similar development models. This new duty given to NGO's is also the responsibility to be the guide in creation of new production resources and employment methods. Environmental dimension is posing the population and development strategies, protection of bio diversity, creation of renewable energy resources, and arrangement of eco – city planning, waste management, planting, micro or macro grade agriculture projects, moves, determination of urbanization strategies. Social dimension is starting a widespread education projects for the acceptance of sustainable development approach in all levels of the society, obviation of acquiring difference between sexes, creation of social integration against political decision making mechanisms and pressure channels. Additionally, protection of social justice equilibrium in the society and unification of it with the environmental justice component, promoting the cultural and moral life quality, youth and social improvement projects can also be appraised in social dimension.

NGO's function in order to meet the basic social needs within the sustainable development process. The most efficient problematic in realization of sustainable development is about how to obtain the best. The most validate key to solve this problematic is four stage application plan; the stages are the determination of the working plan, the determination of the problems about sustainable development, media to perform local policy and the action plan for collaboration with international organizations (Cohen, Arato, 1992:30-34).

4. THE ROLE OF NGO's IN SUSTAİNABLE DEVELOPMENT IN TURKEY

In 1970s in Turkey, environment sensibility evolved relevant to the mass moves fact and gained diversity and multiplied in an integral understanding, parallel to the environment sensibility in the world. But, despite of the intensive activities and facilities of the environmentalist organizations in the West; mostly conferences, seminars and applications by the means of press have been preferred in our country and the civil actions were weak (Açıkalın, 2004: 65). In this mentioned era, sustainable development and environmentalism stayed a basic problem for a group elites and intellectuals.

Starting from the 1980s, there has been an obvious acceleration and increase in environment and sustainable development. Environment movements started spread out to the base of the society and, with effects of the import based and liberal development models, the numbers of NGO's seriously increased. Especially, in 1985, environmentalism took place in politics, and achieved the ability to have characteristics of important pressure and interest groups. In 1990s, almost all of the society became sensible about the environment, and the environment has started to be dealt seriously. In this ten – year period when the EU membership process started, environmentalist actions gained a structure which is dealt in international dimensions and is integrated with the sustainability and environmentalism movements in the world.

When we take a look at the sustainable development and environment activities of the NGO's, today, in Turkey; we can say that it is much weaker than the situation in the Western countries despite of the important steps which were taken. There are many reasons of this situation. The first reason is that, NGO's are not much prevalent as they are in developed countries. In the last ten year period in our country, 180.384 NGO's have been established (www.dernekler.gov.tr, 10.10.2006). 76.817 of these established NGO's still continue its facilities. 478 of these associations serve to the public interest, 406 of them can use special words, and 12 of them can have direct help and the centers of 30 these associations are abroad. There 1.412 NGO's which have facilities about environmental problems and sustainable development. The number of NGO's which have national facilities is 178 (www.stkrehberi.org, 10.10.2006).

The second reason is limited income sources of NGO's and that they can not access infrastructural services. Only 44,2% of the NGO's which have national facilities have social installations and 44,6% of those have related enterprises (www.stkrehberi.org 10.10.2006). Though the management items are various, the NGO's do not have a powerful income. This affects them in a negative manner.

The third reason is the legal structure of the NGO's. Today, when we talk about the NGO's, we come across with foundations, associations, volunteers' institutions, independent enterprises and pressure and interest and groups. In 2005, all these organizations are collected in one frame and a legal regulation, but for long a time, the situation, functions and responsibility fields could not have been clarified.

The fourth reason is absence and deficiency of people's participation in sustainable development and environment facilities. As the social habitudes has not become a civil entrepreneurship yet and as the people are indifference for the NGO concept, reactions stay limited to the events but not to a long term action.

These four reasons mentioned above have been the obstacles in front of the sensibility for the sustainable development and environment actions and this did not let these actions to become in standards of developed countries. However, there is a reputable development in sensibility about sustainability and environment and hopeful results are obtained for the future.

We can say that important steps have been taken lately in Turkey, in order to put the NGO's in a fast improvement process and to make the people sensible about this topic. Especially, after this rapid improvement as a result of the increase in the possibility for the international collaborations, important results have been achieved. The first steps in international collaboration are the ones with supranational organizations such as UN, EU and World Bank. The funds provided by the supranational organizations help to improve the projects as they are allocated both to the state organizations and to the NGO's.

CONCLUSION

The discussions on the basic principles of sustainable development, however, started in the second half of 1970s. Sustainable development is more comprehensive than protection of environment. Sustainable development takes into account coming generations and long term development; and it comprehends improvement of life quality, justice between the generations and social and ethic dimensions of human welfare.

In the studies and report which concern sustainable development concept, sustainable development and struggle with poverty, equity in the distribution of benefits gained from natural resources, population control and development of environment friendly technologies, are associated directly. Within this context, depending on assumption of possibility for realization of economic growth in an environment friendly perspective, it is broached that developing countries will have significant roles in overcoming environmental problems and preventing poverty and that long term growth age which will bring out reconstruction age should be started.

NGO's have very important functions in the process of providing the information society. Starting from the 1980s, there has been an obvious acceleration and increase in environment and sustainable development in Turkey. Environment movements started spread out to the base of the society and, with effects of the import based and liberal development models, the numbers of NGO's seriously increased. Especially, in 1985, environmentalism took place in politics, and achieved the ability to have characteristics of important pressure and interest groups. In 1990s, almost all of the society became sensible about the environment, and the environment has started to be dealt seriously. In this ten – year period when the EU membership process started, environmentalist actions gained a structure which is dealt in international dimensions and is integrated with the sustainability and environmentalism movements in the world.

When we take a look at the sustainable development and environment activities of the NGO's, today, in Turkey; we can say that it is much weaker than the situation in the Western countries despite of the important steps which were taken. NGO's function in order to meet the basic social needs within the sustainable development process. The most efficient problematic in realization of sustainable development is about how to obtain the best.

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ENVIRONMENTAL ESTABLISHMENTS AND ORGANIZATION

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Nowadays, it has been interested in environmental conservation and management because of increasing environmental problems, for this purpose many studies have been done. On this subject both public bodies and various environmental establishments role are getting important day by day.

In this research, problems of organization about environmental subject on national and local scale have been examined and tried to get holistic solutions. For this purpose theoretical organization scheme had been suggested. In this scheme it has been researched that how resultants of organization. Actors of theoretical organization are grouped into five parts. These are; public bodies, Agenda 21 and urban councils, nongovernmental organizations (NGOs), associations and foundations related trade associations. It has been researched problems of environmental organization on local meaning in Adana province.

Keywords: *Actors of environment, Environmental NGOs.*

INTRODUCTION

Today, environment have been thought as integrity of economic and cultural values and it has been guarded mutual interaction among these; with human being that has been its basic elements all the living and unloving creatures; it has been evaluated that all of the physical, chemical, biological and social factors that effect all of the activity and behavior of living things [7]. Environmental policy that will be for sustainability of extensive and many resultants fact; it has to be integrity of consistent decisions that clarify to prevent and solve environmental problems related to aims, objectives, strategies, application instruments. It eventuates only by coordination of public bodies and institutions, Agenda 21 and urban councils, NGOs, trade associations and universities that are favor of environmental conservation. Policies about environment, planning, application and management hierarchy should be constituted by editing very well.

In this research, the roles of institutions and establishments related to environment about environmental problem solutions have been examined deficiency and defect about sharing roles have been tried to reveal in general perspective.

Nowadays, studies about analyzing environmental problems need to be organization on global, national and local scale. The first concrete step for this purpose was held at Stockholm, on 1972 June at United Nations Conference of "Human and Environment" and afterwards "Paris Convention" that was held on 1972 September. After that convention, from the beginnings of 1973 six action programme that applied European Community Environment Policy approved validity. "Environmental Actions Plans" and reports that were prepared by European Commission are related to constituting legal framework of environment management and applying policies of European Community. The other sanctions that provide to apply environmental program at legal framework are regulations, directives and decisions of European Commission. After "Single European Act" on 1987, environmental policies were reunited legal fundamental [4].

The first planned period has been begun in Turkey while these progresses about conservation and development of environment in Europe were experienced. Since 1963, "Five Yearly Development Plan" was prepared. It was the first time that environmental problems were given as a distinct part in third "Five Yearly Development Plan". The most important progress about legal development was the decision about environment was found at the 56th article of "Turkish Republic Constitution". Also at this period "Environmental Law" that determine the main principle and goals of Turkish Environmental Policy, was come into force. Many law and regulations were published and agreed with international contracts until now. The first legal organization in our country was established on 12.08.1978. Afterwards "Environmental Ministry" was established on 09.08.1991. Joining the Environmental and forestry Ministry, It became Environmental and Forestry Ministry on 08.05.2003 [9].

At last two decades, one of the important progresses was the establishment of European Environmental Agency and European Environmental Information and Research Network [8]. On "Assembly of Environmental Ministers of Candidate Countries European Commission" "Adding to European Environmental Agency and European Information and research Network and Agreement" was signed between Turkish Republic and European Community. That agreement, by providing trustworthy and comparable knowledge about statement of environment to European Commission and Agency Candidate countries, to decide right to integrate environmental subject with economic policies and to help progress to sustainability. Another development was the 1992 "United Nations Environment and Development Conference" in Rio de Janeiro. At this conference implementing "sustainable development" concept concerning with "Agenda 21" titled action plan has been emerged. it has been stressed that participation of all major groups has a vital role on implementing environmental policies and application instruments effectively, at the part of "Strengthening the Role of Major Groups" in chapter 23 of Local Agenda 21 document. In this part women, children and youth, indigenous people, NGOs, Local Authorities, Workers and Trade Unions, Business and Industry have been taken in hand. In the part of "Scientific and Technologic Group" a) improving communication and cooperation between decision makers and public b) encourage improving and adopting professional principles and leading rules related to science and technology, are taken place [1]. In addition, the other environmental development has been European Landscape Convention signed on 20.10.2000 in Florence. This agreement was approved on 10.06.2003 by Turkish Parliamentary (TBMM). The most important point of the agreement that countries were signed is stressed on the necessity of constituting their own national landscape policy. In the article 6 it is said that "Each Party undertakes to promote:

a) Training for specialists in landscape appraisal and operations;
b) Multidisciplinary training programmes in landscape policy, protection, management and planning, for professionals in the private and public sectors and for associations concerned;
c) School and university courses which, in the relevant subject areas, address the values attaching to landscapes and the issues raised by their protection, management and planning".

The necessity of the cooperation of all actors of the environmental protection has been become most important by this article [2].

EXAMINATION OF ORGANIZATIONS IN ADANA

Nowadays on both global and local level for conserving, developing and managing environmental quality from the top to bottom degree to tackle again environmental values with the holistic point of view and in the light of them, it has need to be constituted the new legal framework.

When environmental conservation studies are thought as a link of the chain, ministries are the most authorized unit as an upper link.

Public institutions and establishments work for "Environmental Effect Assessment" and "Strategic Environmental Assessment" studies and prepare environmental inventories and environmental condition reports. For instance, chemical material based on agriculture and fodder row material production establishment and depot of industrial and medical gasses "Environmental Effect Assessment" planning was implemented by Adana Environmental and Forestry Head Office.

"Local authority" is the structure that will decide appropriate urbanization progress on urban. Municipals are most important step of the local authority on the application point. Municipals are institutions that execute public services to public interest at the local. Indirectly, local authority is active for solution of all problems that concern urban. Problems are determined and entered in the agenda by mediation of "Local Agenda 21" and urban council activity groups and it is cooperated with the required institutions and establishments for scoping out. For this purpose, Adana urban council constituent committee was established by the participation of 46 voluntary delegates. Thus, urban council establishment progress has been initiated by leading of NGOs. Urban council production platform is formed bye working groups, platforms and assemblies. They are consisting of science-education institutions, foundations, trade associations, fellowship and working groups. Working groups are productive units that study as a voluntary for solution of urban problems and prepare "Adana 21st Century Action Plan". They attend each activity for attaining "sustainable development-livable urban" object. They have reacted to different usage of areas that was determined as green areas on the development plans. In this context, environment, urban, tourism and economy are working group and agriculture; underground sources; air-water-soil pollution; urban environmental quality; solid waste management; environmental education and coordination are subgroups and also legal, administrative and economic solutions for environmental content commissions. These working groups play a rather important role for building the public opinion and agenda about environmental subjects.

Voluntary associations organized local discontent and put pressure on the public authorities and polluters for the solution of the environmental problems. The local press played an important role in this process. Sometimes public authorities collaborated with the local press to put pressure on polluters.

Different levels of government, local governments and private actors co-operated for environmental problem solving.

In Turkey both NGOs have environment subject tried to put on the agenda and make the government made a special effort for taking measures, was displayed activities and have been succeeded. For example, these organizations have a great part to direct the authority and to constitute the policy on preparing environmental laws and sentence about environment that took place in Constitution [5].

NGOs have played great role to form communication network with public, securing information relations and have a great effect on administrative and political decisions about conservation by their structure which has existed from volunteers. Besides they serve as providing interest and monetary support for certain subject, rendering conscious of society and form dialog framework [3].

NGOs offer complementary sources to official institution like knowledge, skill, desire and approach away from official view point of people. At the same time numerous NGOs achieve important funds for improvement and humanitarian support, on these subject management activities and ambiguities are noticed as valuable additional assistance [6].

NGOs and trade associations have an active part on environmental conservation and development oriented stages of project planning and application. They train education programs about conservation, management and planning of environment for individuals that work on private and public sectors and relevant associations.

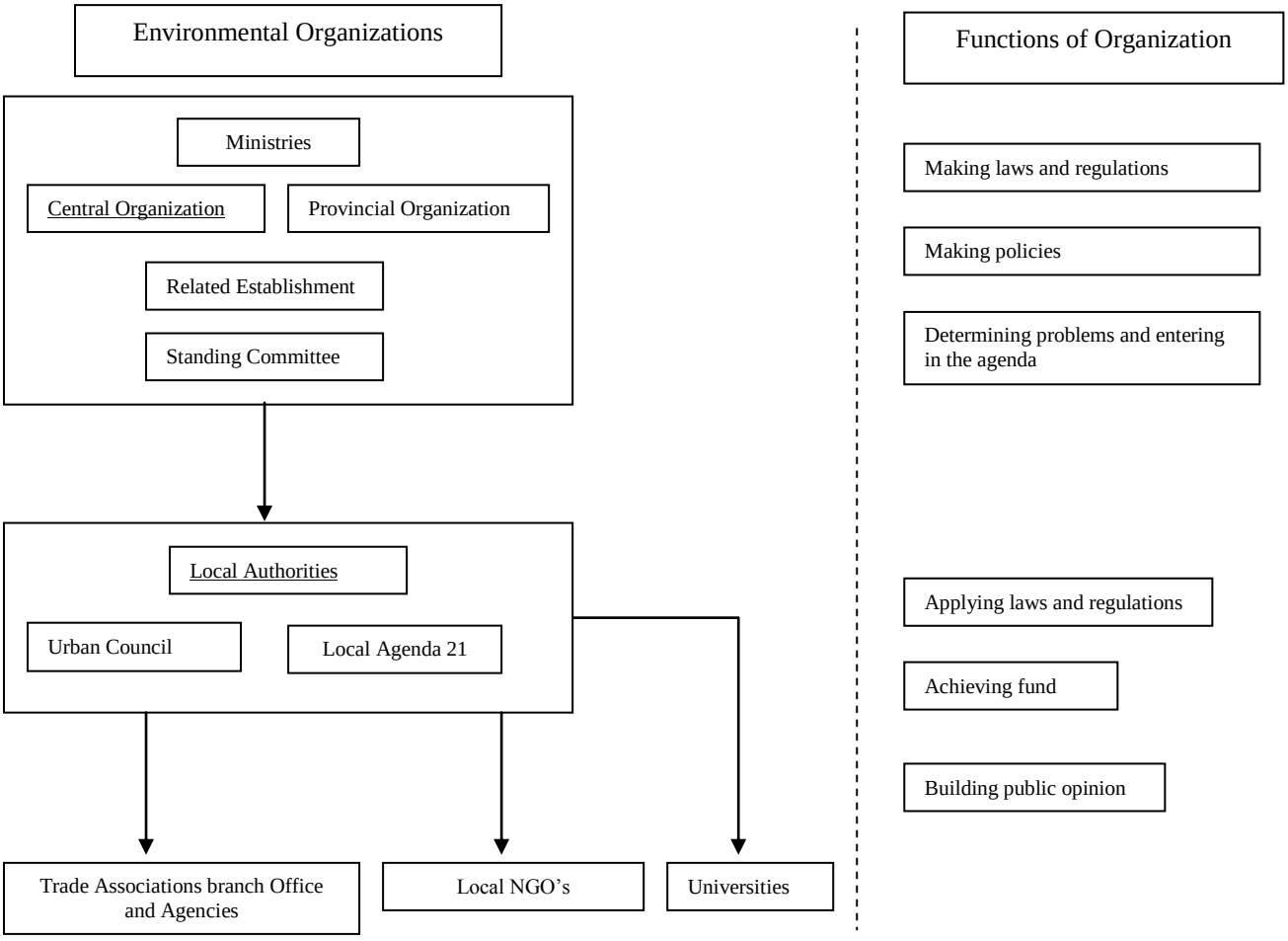
Trade associations to build public opinion about subject related to environment to make a statement to local mediums, to organize panels, conservations, meetings, protest march for mobilizing public sentiment. Thus, they provide people to take cognizance of environmental problems to act in concurrence for solution. In addition although they could act in their own name, they also act on Province Coordination Commision's behalf in concurrence. For instance, they act in concurrence for being brought away the Seville orange trees in Adana and managing Çukurova University's land for another aim. Adana deputies, public bodies connected with central management and local authorities will implement this plan and policies. Universities are very important for attaining planning aim, in our region scientific and actional assistance of Çukurova University is very important. Landscape Architecture Department of Çukurova University has been prepared many scientific studies. Some of these are:

-Recreational land use plan of Seyhan Dam Lake and its environment was prepared and findings were sent to institutions and establishment related to physical planning.
-Problematic lands of Çukurova Region, planning and applications were done for reclamation and bringing in nature. Akyatan Dune assessment and Çakıtsuyu valley reclamation were the important ones of studies.

-In 1990 it has been studied that is related to conservation and development of cost of Çukurova Region. EIA studies were accelerated and prepared EIA Report for many establishments.
-In the late 1990s Aladağlar National Park and Karatepe-Aslantaş National Park Master Plans were prepared. These plans were ratified by related ministries and come into force.

In the directions of this information, organization scheme is show in the table 1.

Table 1: Structure of Environmental Organization



CONCLUSION

The judicial and administrative system of our country has a basic substructure to protect sensitive and precious natural recourses with various scales and dimensions but nonexistence of the upper level national environmental policies is a deficiency. Environmental conservation and sustainable usage that are in authorization and mission of the public bodies is the other problem. Generally, the reason is that former legislations about environment are protected and new theoretical structure is put on the former one. The situation has been the same on provincial organization and local authorities. Although municipals and civilian administrations are authorized on inspection and sanction objects, they couldn't use properly their authority such like insufficient personnel and technical rigging. Similar problems have been experienced about environmental organization in Adana.

It has been summarized as;
It has been rather important national and international any event about environment in the face of to get required knowledge, among different disciplines and institutions. Thus, a system should be established for having a guiding characteristic of attained knowledge on deciding process and providing participation of different interest groups. Because of deficient operation and limited authorization at provincial organizations of public bodies and institutions, it has difficulties acting together with the other actors at local scale. It has been seen that there are not any approach relating to providing participation of public on environmental assessment process. It should be provided facilities of public to participate on urban authority as civil initiative.

NGOs react not only for negative affects about environment but also they should acquaint public with solutions to build public opinion. They should persuade related units as ministries and press to solve the environmental problems.

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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 350,000m^2 and have the capacity to hold a total of 5,000 people. There are also 14 dormitories with a capacity of 5,000 students, but the construction of new dormitories is also planned.

Near East University has adopted life long education as its main mission. Thus, we begin with our Kindergarten, Junior College and Secondary High School which have a total number of 2,000 students. The faculties and departments offering undergraduate and graduate degrees are as follows:

FACULTIES

1. Faculty of Architecture
   - Architecture
   - Interior Design

2. Faculty of Arts and Sciences
   - English Language & Literature
   - Mathematics
   - Turkish Language & Literature
   - Psychology

3. Faculty of Economics & Administrative Sciences
   - Banking & Finance
   - Business Administration
   - Computer Information Systems
   - Economics
   - European Union Relations
   - Human Resources Management
   - International Business
   - International Relations
   - Marketing
   - Political Sciences
   - Information & Records Management

4. Faculty of Communication
    - Radio-Television-Cinema
    - Motion Picture Production
    - Journalism
    - Public Relations & Advertising

5. Atatürk Faculty of Education
    - English Language Teaching
    - Computer & Teaching Technologies
    - Pre-school Teaching
    - Elementary Teaching
    - Turkish Language Teaching
    - Guidance & Psychological Counseling
    - Human Resources
    - History Teaching

6. Faculty of Engineering
    - Civil Engineering
    - Computer Engineering
    - Electrical & Electronic Engineering
    - Mechanical Engineering
    - Biomedical Engineering

7. Faculty of Fine Art & Design
    - Graphic Design
    - Plastic Arts

8. Faculty of Maritime Studies
    - Department of Deck
    - Maritime Management
    - Marine Engineering

9. Faculty of Law
    - Law

10. Faculty of Performing Arts
    - Dramaturgy & Dramatic Authorship
    - Acting

11. Faculty of Pharmacy
    - Pharmacy

12. Faculty of Dentistry
    - Dentistry

13. Faculty of Health Sciences
    - Nutrition and Dietetics
    - Nursing

14. Faculty of Medicine

SCHOOLS

1.School of Physical Education & Sports
-Coaching Education
-Physical Education and Sports Teaching
-Sports Administration

2.School of Tourism & Hotel Management
-Tourism & Hotel Management

3. School of Maritime
-Deck
-Marine Engineering
-Maritime Management

INSTITUTES

-Institute of Education Sciences
-Institute of Sciences
-Institute of Social Sciences
-Institute of Health Sciences

With the opening of the NEU Grand Library in December 2005, the University has passed a new and critical mileage stone entering truly the information age. The Grand Library is fully computerized and linked to many major world libraries and research institutions throughout the world. The library has a collection of more than 600,000 printed materials and access to more than 110 million electronic articles. The library has recently been elected as the central library for the Turkic world and now serves universities of several different countries such as Azerbaijan, Kyrgyzstan and Turkmenistan. The library is open 24 hours a day serving not only the university but the whole community.

The University has until now organized 14 International Conferences & Congresses and many local and regional conferences, seminars and panel discussions on a variety of subjects. Near East University believes that the role of the University is not merely to provide formal education but to establish close relations with the wider community. As such, it places special emphasis on strengthening and developing campus-community relations. The University set up a Lifelong Education Centre (YABEM) which provides a wide variety of adult education courses. The University also makes the use of its facilities for cultural, sports and recreation activities available to the public.

As you can see, NEU is one of the fastest growing Universities of the world. The last two years has been devoted towards Health Sciences. This year, we began education in the Faculty of Dentistry, Faculty of Pharmacy and Faculty of Health Sciences. Another important improvement that has been made in our university regarding Health is that in September 2008, education has begun in the Faculty of Medicine. The Faculty of Medicine Research Hospital will be opened in July 2009. The Hospital will have a capacity of 500 beds with a 4,5000m^2 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 8,500m^2 was opened last year. It consists of 3 sections: NEU-IBM Innovation Centre, NEU-IBM Advanced Research Centre and the NEU Technopark. The 'super computers' used in the building have a capacity of 12 trillion processes per second. The research areas consist of Global Warming, Earthquake Stimulation, Defense Research (military), Space Research, High Physical Energy, Nanotechnology and Biotechnology research and product design, Medical, Pharmaceutical, Microbiological, Health Science and Social Sciences. NEU Innovation Centre is unique with its facilities in Eastern Europe, Middle East, Central Asia and Northern Africa.

BRIEF INFORMATION ABOUT TURKISH REPUBLIC OF NORTHERN CYPRUS

History: Cyprus has been occupied successively by Assyrians, Babylonians, Egyptians, Persians, Romans, Lusignans and Venetians who have sought the island's wealth of minerals and timber since the 8th century BC. The Ottoman Empire conquered the island in 1571 and ruled it until the island was leased to the British Empire in 1878. In 1963, the Republic of Cyprus was established by the Turkish Cypriot and Greek Cypriots, based on political equality. The Turkish Cypriots were forcefully ejected from the state mechanism in 1963. Intercommunal clashes which broke out in 1960 continued until 1974. A military coup by Greece in 1974 aiming to annex the island to Greece was aborted by the intervention of Turkey, which was one of the Guarantor Countries. Following the Exchange of Populations Agreement in 1975, Turkish Cypriots moved to the north and Greek Cypriots moved to the south of the island. Consequently, the Turkish Cypriots established their own administration and in 1983, the Turkish Republic of Northern Cyprus was proclaimed.

Negotiations between the two sides under the auspices of the UN started in 1968, with the aim of finding a comprehensive settlement in Cyprus. The latest negotiation process came to an end when the compromise plan, Annan Plan, prepared by the then UN Secretary General Kofi Annan, was overwhelmingly rejected by the Greek Cypriot people. During the referendum held on 24 April 2004, whilst 65% of the Turkish Cypriots voted "Yes", 75% of the Greek Cypriots voted against the plan; thus, eliminating the possibility of establishing a new partnership republic. Despite their obstructionist attitude, the Greek Cypriot administration unilaterally entered the European Union under the usurped title of the "Republic of Cyprus", on 1 May 2004. The then UN Secretary General Kofi Annan, expressed his regret and noted that *"he hoped ways would be found to ease the plight in which the (Turkish Cypriot) people find themselves through no fault of their own"* (24 April 2004). In his report to the Security Council, he called upon the international community to *"cooperate both bi-laterally and in international bodies to eliminate unnecessary restrictions and barriers that have been the effect of isolating the Turkish Cypriots and impeding their development"* (S/2004/437). The current UN Secretary General Ban Ki-moon also referred to the economic and social isolation of the Turkish Cypriot people in his report to the UN Peacekeeping Force in Cyprus (UNFICYP) in December 2007, pointing out that promoting the development of the Turkish Cypriot people would make the reunification of the island "occur in as seamless a manner as possible." Observing the injustice against the Turkish Cypriots, who have been experiencing all kinds of inhuman restrictions for years, the EU also expressed its will to enhance the economic development of Turkish Cypriots through an aid package. The EU Commission adopted a proposal, which had foreseen the transfer of 259 million Euros financial aid. However, the Turkish Cypriots have not been effectively benefiting from the EU aid due to Greek Cypriot administrations' pressures.

After the Presidential elections in February 2008 on the Greek Cypriot side, President Mehmet Ali Talat has reiterated once again his readiness for a new process of full-fledge negotiations and expressed his sincerity towards a solution.

Places to visit: In Lefkoşa (capital): Selimiye Mosque, Mevlevi Museum, Sultan Mahmut Library, Dervish Pasha Mansion and Lapidary Museum. In Gazimağusa: Antique Ruins of Salamis, Kantara Castle, Othello Castle, Lala Mustafa Paşa Mosque, Canbolat Museum, Ruins of Ayios Philion, St. Barnabas Icon Museum and Apostolos Andreas Monastry. In Girne: Kyrenia Castle, Bellapais Abbey, St. Hilarion Castle and Buffavento Castle, and in Güzelyurt: Soli Ruins, St. Mamas Monastry and Vouni Palace.

Nature: North Cyprus hosts over 1,600 plant species (22 are endemic), 350 species of birds (7 are endemic), and there are 26 different species of reptiles and amphibians. Every year, 250 different kinds of birds, around 100 million, migrating from Europe to Egypt pass through North Cyprus. The country also became home to some 50 different varieties of butterflies. Visitors are amazed to see that there are 30 different varieties of orchids on the island, 7 of them unique to North Cyprus. Rich underwater plant life and 200 different types of fish are making the blue Mediterranean waters attractive for sea lovers. 30% of the turtles in the Mediterranean, amongst them Carretta Caretta, Chelania Mydas (Green Turtle) and Dermachelys Corniacea, come to the coasts of North Cyprus for breeding.

Life-style, Culture: Turkish Cypriots are well-educated, social and hospitable people. North Cyprus is popular with its handicrafts, cuisine, traditional music and folk dancing. The Turkish Cypriot Cuisine is famous for its kebab dishes and starters called "mezes". Daily fresh fish, meat, vegetables and fruit used in the Turkish Cypriot cuisine make the dishes both tasty and healthy. Local alcoholic drinks include rakı, brandy and red and white wine. Baklava, kadayıf and katmer are deserts favoured by most and Turkish Coffee is a must at the end of every dinner. The cultural and art facilities make the country attractive both for the tourists and foreign students. During the hot summer months, people prefer to relax by the sea whereas during the fall season, people go on picnics and long walks in the mountains and countryside. Indoor activities like exhibitions, cinemas, theatres and concerts are always available.

Electricity: 240 volts A/C. 50 Hz.

Traffic: Driving is on the left and international traffic and road signs are used. Maximum speed on highways is 100 km/hr. Vehicles entering North Cyprus must be insured upon arrival. Please refer to the Turkish Embassy or TRNC Representative Office in your country to check visa requirements.

Climate: North Cyprus enjoys a Mediterranean climate with long, dry summers and short wet winters. The average annual temperature is 19ºC. The weather in winter is very mild with temperatures ranging between 9ºC-12ºC. Average annual rainfall is 500mm.

Emergency telephone numbers: Fire 199, Police 155, First Aid 112


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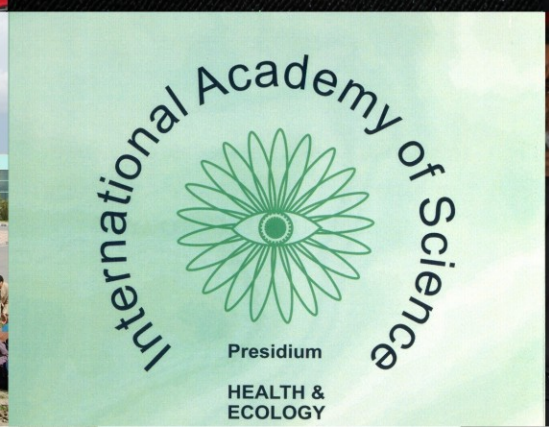
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