SEC.GAL/64/08/Rev.1
22 April 2008

ENGLISH only

Organization for Security and Co-operation in Europe
OSCE Secretariat

Report

OSCE Chairmanship / NATO Workshop on

"Water Scarcity, Land Degradation and Desertification in the Mediterranean region - Environment and Security Aspects"

"Museo de las Ciencias Príncipe Felipe"
City of Arts and Sciences
Valencia, Spain
10-11 December 2007

Table of Contents

Executive Summary 1
Background and Justificaion 2
Welcoming Address 3
Ambassador Jose Angel López-Jorrin, Head of the OSCE Task Force, Ministry of Foreign Affairs, Spain, OSCE Chairmanship 3
Mr. Bernard Snoy, Co-ordinator of OSCE Economic and Environmental Activities 4
Keynote address 7
Environmental Conditions in the Mediterranean Region: Possible future Scenarios - Mr. Henri-Luc Thibault, Director of UNEP Blue Plan 7
Status of Desertification in the Mediterranean Region - Prof. Uriel Safriel, Hebrew University of Jerusalem. 12
Reviewing Land Use and Security Aspects in the Mediterranean Region - Prof. Winfried E.H. Blum, University of Natural Resources and Applied Life Sciences, Vienna 14
Water scarcity and Desertification as a Security Challenge in the Mediterranean Region - Dr. José L. Rubio, Centro de Investigaciones sobre Desertificación – CIDE – CSIC. Valencia 31
Buzan, B. (1998) Security: A new Framework for analysis, Boulder, London. 38
Guillaume, B. and Comeau, A (Eds.) ((2005) A Sustainable Future for the 38
Rubio, J:L:, Garcia-Novo, F., Baldasano, J.M. and Martin Mateo, R. (2006) Estrategia Mediteranea de Desarrollo Sostenible. Generalitat Valenciana 38
Rubio, J.L. (2007) Mecanismos de retroalimentación entre desertification y cambio climatico. In: Cambio Climatico y sus Consecuencias. Presidencia de la Generalitat. Fundación Premios Rey Jaime I(ed). Generalitat Valenciana. 38
Rubio, J.L. (2007) Desertification y Cambio Climatico. Ambienta, 26-27, 70 38
Ullmann, R.H. (1982) Redefining Security. International Security, 8(1), 129-53 38
Grounding security, securing the ground - Mr. Grégoire de Kalbermatten, Deputy Executive Secretary, UNCCD 39
Working Groups Reports 55
WG I - Security Implications of Unsustainable Water Management and Land Use 55
WG II - Loss of Livelihoods and increased Migration 56
WG III – Linkages between Combating Land Degradation, Desertification and Conflict Prevention 57
WG IV – Managing Water Scarcity 58
Closing Plenary - The role of the OSCE and NATO, and other competent organizations in raising awareness about environment and security aspects in the Mediterranean Region. 60
ANNEX I 62
Egyptian Water and Soil: A Cause for Migration and Security Threats? - Tamer Afifi, United Nations University Institute for Environment and Human Security, UNU-EHS, Bonn 63
Introductory remarks to the Working Group IV: Managing water scarcity- Prof. Mohamed BADRAOUI 75
ANNEX II 77
Agenda 78
Background Paper 82
List of participants 93

Executive Summary

Based on the suggestions made by the speakers of Plenary Session IV "Challenges to the management of water resources and to countering desertification in the Mediterranean region" during the 15th Economic and Environmental Forum, the OCEEA proposed to organize a workshop on "**Water Scarcity, Land Degradation and Desertification in the Mediterranean region - Environment and Security Aspects**".

In order to build on common synergies, OSCE sought co-operation with colleagues from NATO, in particular from the Science for Peace and Security Programme. NATO has a longstanding expertise on the issue and had organised in Valencia, in December 2003, a NATO scientific Workshop on "Desertification and Security in the Mediterranean Region". The objective of the new proposed workshop would be to broaden its focus from the scientific community to include also policy makers.

The workshop, aimed at government officials from the Mediterranean Region[1], gathered representatives of Water management, Land degradation and Desertification Departments of Ministries of Environment and representatives from the Ministries of Foreign Affairs. In addition, policy makers, scientists and experts were also invited. The aim was to discuss how the OSCE, NATO and other competent organizations like the UNCCD, the UNEP, the MAP, and the EU could play a role in ensuring that environment and security linkages in terms of water scarcity, land degradation and desertification, are addressed in the Mediterranean Region.

The Workshop was structured in three Plenary Sessions, with keynote speakers and four Working Groups to facilitate the dialogue and exchange of ideas between the participants on the different key topics.

A total of 70 participants from 24 different countries attended the Workshop, contributing with their ideas and experience to its success, reflected in the large number of concrete recommendations for the OSCE and NATO.

Among the recommendations, the importance of implementing a survey and/or an assessment on water scarcity, land degradation, desertification and security in the Mediterranean Region, was underlined by many participants. An international initiative at this level could be implemented, according to example of the ENVSEC initiative, which aims at addressing environmental risks to security and fostering stability through environmental co-operation,

As a conclusion, participants agreed that the synergies between scientists and diplomats and the intense brainstorming regarding different issues resulted in a fruitfull debate producing valuable ideas and possible initiatives for the near future. Another conclusion is that the advance in a North-South Mediterranean cooperation, with a maintained dialogue between countries, can be the best, and perhaps the only way to assure sustainability and security of the whole region.

[1] The document uses a restrictive notion of the Mediterranean region, limited to the OSCE Mediterranean Partners for Co-operation (Algeria, Egypt, Israel, Jordan, Morocco and Tunisia) and the NATO Mediterranean dialogue (all the OSCE Mediterranean partners, plus Mauritania).

Background and Justification

Environmental degradation has become a matter of concern for the society in last few decades. Usually, only when clear and serious environmental effects appear affecting socio-economic issues, this problem is taken in consideration by policy-makers and goverments. These environmental changes can originate from natural or human induced causes, the latter being the more important source of degradative impacts world-wide. Among these impacts, land degradation and water scarcity can be considered as triggering factors that affect both environment and human sustainability, under a changing climate.

Throughout the 20th century, the world population has tripled and, in parallel, water consumption has increased, approximately, by six. Increasing population is followed by an increasing pressure on natural resources for food and goods production and human settlement, which can cause the exhaustion of these resources in fragile environments. This population bulge accompanied by land stress and water scarcity may produce the displacement of population masses to other territories, usually urban centers, which can spread beyond borders with destabilizing effects on the stability and security at regional, national and international level.

These phenomena are more relevant for developing countries, mainly in arid, semiarid and dry-subhumid areas of the world. A great part of the Mediterranean region shows these characteristics, together with a particular climatology with scarce rain and recurrent drought periods. These ecosystems show great fragility, being particularly sensitive to alterations in their water regime. Their situation could become more critical given the climate perspectives highlighted by the Intergovernamental Pannel on Climate Chenge on 2007 in its 4th Assesment Report and in its Summary for Policymakers. The IPCC predicts a clear tendency toward reducing the number of rain storms but increasing their agresiveness, and the rise of temperatures.

These predictions run in parallel to the population growth of the area, which will provoke the consequent need of resources, mainly agriculture. It has to be considered that agriculture is the source of much of the wealth generated in developing societies, also in the Mediterranean. However, irrigated agriculture, currently responsible for about two-thirds of the water consumption in the Mediterranean Region, increases the necessity of more water resources. The use of inadequate agricultural and land management practices is causing soil exhaustion, loss of vegetation cover, soil erosion, biodiversity loss and the advance of the desertification processes in great parts of the Mediterranean region. Actually, the associated consequences of that are clearly visible in many Mediterranean countries, being translated in shifts of population towards urban nuclei, migrations, effects on national economies, class and ethnic cleavages, alterations in the home security of countries, and international national and trans-boundary conflicts.

To avoid or minimize those threats and to find effective ways for the sustainability of the vital land and water resources are pressing necessities. This requires not only better use and management of land but also improvement in the governance of natural resources, which could contribute to consolidate the stability of societies and strengthen institutions and their legitimacy.

Welcoming Address

Ambassador Jose Angel López-Jorrin, Head of the OSCE Task Force, Ministry of Foreign Affairs, Spain, OSCE Chairmanship

Excellencies,
Ladies and Gentlemen,

On behalf of the Spanish Chairmanship, I would like to open this Workshop on Environment and Security Aspects of Water Scarcity, Land Degradation and Desertification in the Mediterranean Region.

I would like to give my special thanks to Jorge Lamparero General Director of the Conselleria de Medi Ambient, Aigua, Urbanisme i Habitatge, of the Valencian Governement for the support provided in organizing this workshop. I would also like to thank Mr. Bernard Snoy, OSCE Co-ordinator of the Office of Economic and Environmental Activities, and his staff here with him today; Dr. Fausto Pedrazzini Programme Director of the NATO Public Diplomacy Division, and Dr. José Luis Rubio, from the Centro de Investigaciones sobre Desertificación, here in Valencia. Thanks indeed José Luis for your support.

Ladies and Gentlemen,

As we all know, water scarcity and land degradation are issues that affect severely the Mediterranean region. Spain is suffering from severe droughts that force the rationalization of water supply and demand new approaches to water management if we are to meet the water demand of the future.

In the Ministerial Council of the OSCE two weeks ago in Madrid, the Spanish Chairmanship got the consensus to approve the first ever Ministerial Decision of this organization on Water Management. This is a true breakthrough which we highly value as it gives a considerable support, at ministerial level, and among other issues, to the efforts that Spain is already doing to prepare the International Expo 2008 in Zaragoza on Water Management and Sustainable Development. This will be a major event next year and I take this opportunity to invite you to be there.

Land degradation is advancing at a fast pace, and if the global climate trends continue as expected, most of the Spanish territory could be a dryland in the near future. In November, in this same location, the IPCC issued its 4th report that explains the consequences of climate change in all regions of our planet, and stresses the need to implement adaptation and mitigation measures.

But not all are grim perspectives. We have also positive experiences to share. The organization of water management in Spain is considered state of the art in regards to its river basin management authorities: I am glad to see a representative of the Jucar river basin authority in the Working Group dealing with Water Scarcity. On the other hand, drought, desertification and land degradation are of the outmost concern for Spain, and within the EU

Spain has contributed to the new proposal for a framework Soil Directive, by providing its expertise and first hand experience.

We are gathering in Valencia to discuss the links between environment and security. We have invited scientists and diplomats, because we believe that bridging the gap between the scientific findings and the agreements that governments sign to combat desertification or co-operate over water resources are better implemented in forums like this one, where we will discuss during two days in small working groups what are the threats and challenges and what are the opportunities for cooperation.

Having said this, I am very proud to recall that an outstanding achievement of the Spanish Chairmanship in the already mentioned Ministerial Council of the OSCE was the approval of the Madrid Declaration on Environment and Security. It is a very innovative document, with no precedents, which sets very clearly the link between environment and security. Until now this link had been partially hinted in very few political texts, but with the Madrid Declaration we have now the first ministerial level document fully devoted to the impact on security of environmental threats, and what is more, with it the OSCE can be considered the first international organization to go so far in this respect by underlining that environmental cooperation is fundamental to diminish tensions and, eventually, to prevent conflicts. This is a major breakthrough and we must continue our work to explore ways to use the environment as a tool for co-operation, at the same time as we prevent environmental deterioration by bringing together scientists and Ministries of Foreign Affairs.

Some of you might not be completely familiar with the work of the OSCE in economic and environmental activities, but the OSCE is proving to be an excellent platform for dialogue, and exchange of ideas on important issues to our participating States. By linking environment and security aspects, we are looking into the relationships that, for instance, land degradation might have on migratory pressures or the opportunities that water management offers for co-operation. These discussions might lead us to new or reinforced transboundary co-operation agreements or just a recommendation for the OSCE and NATO, to support Mediterranean countries in exchanging best practices or sharing technology.

This year, as Chairmanship of the OSCE, Spain has worked with enthusiasm to reinforce the role of this organization on environmental challenges. This is a clear niche for the future of the OSCE and will be indeed a Spanish legacy to this organization. Let me share with you this enthusiasm by expecting that the conclusions of this workshop will serve as a basis for future stronger involvement of the Mediterranean partners into the OSCE and NATO activities, and by committing myself as part of the OSCE troika in 2008 to convey the message to the Finnish and Greek incoming Chairmanships for their consideration and action

Thank you all for joining us here during these two days.

Mr. Bernard Snoy, Co-ordinator of OSCE Economic and Environmental Activities

Ladies and Gentlemen,

As Ambassador López Jorrin has expressed in his opening address, we are going to explore the links between Environment and Security during the next 2 days in Valencia, but the concept of environment and security is not new for the OSCE or NATO.

I would like to briefly explain to you one of the programmes my Office is conducting:

I am referring to the Environment and Security Initiative: The Environment and Security Initiative or ENVSEC initiative, is a partnership of 6 international organizations including the United Nations Environmental Programme, the United Nations Development Programme and NATO. This initiative deals with environmental security as it is defined in the background paper that is among the documentation you have received:

On the one hand we look at the positive impact of environmental factors on security like environmental co-operation over shared natural resources, but we also pay attention to the potential negative impacts that environmental challenges like those caused by human activities can have on stability.

We have come a long way since we first introduced this concept in 2003. We have undertaken regional assessments that signal which areas need more attention with the help of maps that can be easily read and understood by decision makers. The assessments go hand in hand with work programmes to improve the security situation using environmental co-operation as our common language.

Right now the ENVSEC initiative covers 4 OSCE areas: Central Asia, The Southern Caucasus, Eastern and South-Eastern Europe and has a portfolio of more than 60 projects with a total budget of around 2 Million US Dollars per year

The Ministerial Council Declaration on Environment and Security which Ambassador Jorrin referred to, sets the political ground for the OSCE to develop further its work in Environmental Security assessments.

Giving a stronger to role to the Mediterranean partners for Cooperation is another of the Spanish Chairmanship priorities, and as a proof, this workshop is a recommendation of a plenary session during the past 15th Economic and Environmental Forum organized in Prague earlier this year.

Is it obvious to me that the combination of these two priorities would be an excellent outcome of this workshop.

These two working days aim at discussing how the OSCE, NATO and other international organizations can play a better role in ensuring that environment and security linkages are addressed in the Mediterranean region.

To achieve this we will combine keynote addresses with small group work. The keynote addresses will provide us with a description of the issues to discuss later in smaller working groups. At the end of each Working Group, the facilitators will present the conclusions to the plenary, so all participants will be able to listen to what has been achieved in the other group.

To accomplish these tasks, we have gathered a team of keynote speakers and facilitators that will guide you through the discussion. Experts from UNEP, UNCCD, NATO, research institutes and river basin organizations will provide the forum for discussion during the parallel working groups. I thank them in advance for their work.

But the real outcome of the workshop, the measure of success of this event, depends on you. It depends on the deliberations and conclusions that you will achieve. It depends on your recommendations and your proposals.

For that purpose, I shall ask you to be proactive; to participate and enrich the debate with your point of view and your perspective of the issues at hand.

We are not divided into country delegations negotiating a consensus document: We are experts discussing technical issues with a view to finding practical solutions and follow up actions. For this reason, the moderators and facilitators have been instructed with guidelines to make sure that prepared lengthy statements are kept a minimum and to ensure a free flowing dialogue and discussion.

As you can see in the agenda, today we will focus on the **challenges** we face: How water scarcity and land use affect security on the one hand, and how migratory pressures might be a result or a push factor of environmental degradation.

Tomorrow, however, we will focus on **sound practices** to manage water scarcity and how **sustainable management** of land can prevent the exacerbation of poverty and thus prevent a negative impact on social stability.

Ladies and Gentlemen,

Let me finish my intervention with an overview of the expected results:

First of all, there will be a publication containing the proceeding and background papers of this workshop. Secondly and perhaps more importantly, we believe that your recommendations will lead us to stronger and palpable follow up:
This follow up could be to support some Mediterranean countries in setting up or supporting existing agreements over shared natural resources;
The follow up could be to organize a specific workshop on technology transfer or share our experience in setting up Public information centres;
It could be to receive a request to develop an Environment and Security assessment for the whole Mediterranean Region, similar to what ENVSEC has done in the other regions.

The choice is yours and yours is the challenge to make use of the OSCE and NATO for these purposes.

Thank you for your attention and let me once again thank Spain and NATO for making this workshop possible, and lastly my office for the excellent organization.

Keynote address

Environmental Conditions in the Mediterranean Region: Possible future Scenarios - Mr. Henri-Luc Thibault, Director of UNEP Blue Plan

Facing water stress and shortage in the Mediterranean

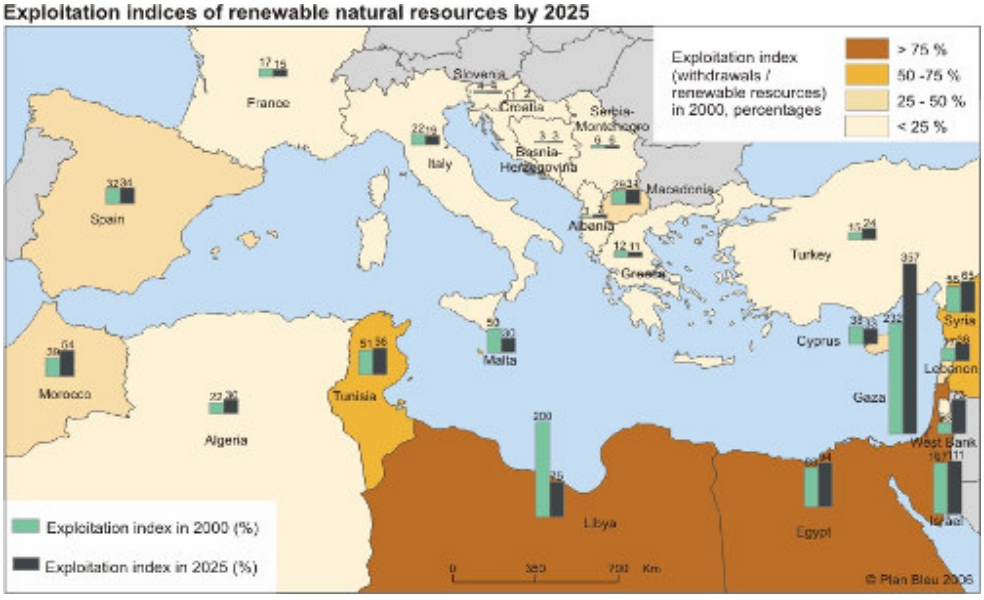
In the countries bordering the Mediterranean Sea, water resources are limited and unevenly apportioned over space and time – Southern Rim countries have access to only 13% of total available resources.
Thirty million Mediterranean people, particularly in the South and East, are deprived of access to drinking water.
Within a context of worsening shortage in parts of the region and in view of the uncertainties brought about by climate change, the Blue Plan work highlights the absolute need to adapt water management policies, to better manage the different water uses and to ensure more optimal and effective use of resources, if present and future needs of populations and development are to be satisfied.

Growing pressures on water resources

During the second half of the 20th century, water demand, i.e. the amount of resource abstraction (95% of total withdrawal, including losses during transport and use) plus unconventional production practices (desalination, wastewater reuse…), has increased twofold, reaching 290km^3 in all riparian countries in 2000. Agriculture is the main water-consuming sector and accounts for 63% of total water demand (42% in the North and 81% in the South and East), while it only remains marginal in the Eastern Adriatic countries.

By 2025, the significant increase in pressures on water resources, gauged by *the exploitation index of renewable natural water resources*, highlights strong and sometimes alarming contrasts as regards the "future of water" (Figure 1). Today, in some countries, water withdrawals already near or even exceed the limit threshold of renewable resources. Current and future situations are even more alarming when the index is calculated at the scale of the Mediterranean catchment areas, rather than at the country scale.

Figure 1
Exploitation indices of renewable natural resources by 2025



Source: Plan Bleu, J. Margat

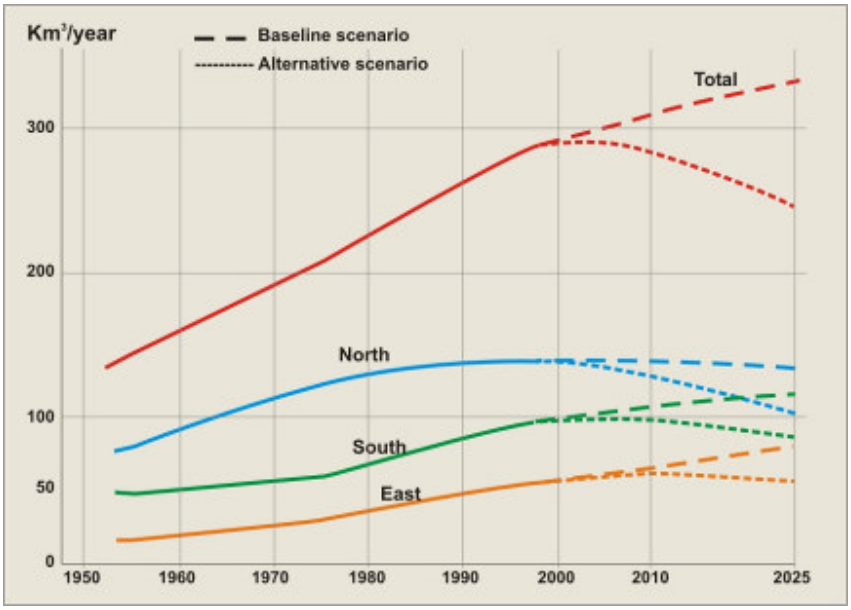
Note: Indices nearing or exceeding 75% reveal very strong pressures exerted on water resources; ratios between 50 and 75% point significant medium-term risks of structural stress; indices between 25 and 50% indicate that countries may endure local or fluctuating stress.

Pressures can also be qualitative. Many aquifers, particularly in the North, show excessively high contents of pesticides or nitrates. Twenty-seven million Mediterraneans are deprived of access to improved sanitation systems, mainly in the South and in the Middle East. And everywhere, many rivers are subjected to chronic pollution due to non-treated domestic and industrial discharges.

Water demand incompatible with resource availability

According to the projections of the Blue Plan baseline scenario, water demand may increase by a further 43km^3 by 2025, essentially in the Southern and Eastern countries, and mainly in Turkey and Syria (Figure 2).

Figure 2 Total water demand, baseline and alternative scenarios (entire countries)



Source: Plan Bleu

Agriculture is expected to remain the main water user in volume, for water resource to satisfy irrigation requirements, in particular in the South and East. According to FAO, irrigated surfaces could increase by 38% in the South and by 58% in the East by 2030, whereas in the North, water demand for agriculture would remain stable and even decline (Italy).

Growth in *drinking water* demand is also expected to continue, to satisfy the needs of ever-larger urban populations – additional 98 million urban residents are expected in the South and East by 2025 – and ever-expanding tourism.

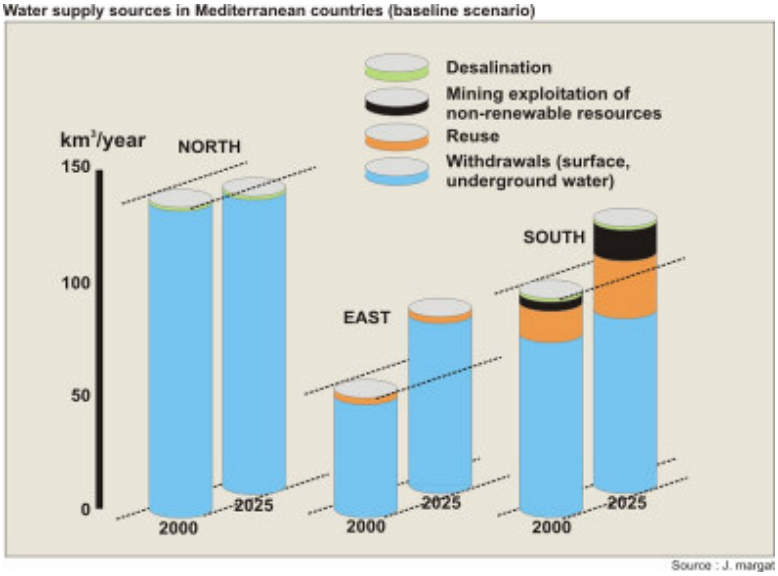
The difficult-to-quantify *environmental* water demand, essentially required for the proper operations of ecosystems, may also increase. Some countries have included in their legislation the respect of a minimum flow in rivers set for the survival of species (France) or have included more explicitly an environmental demand (Spain). Other countries, such as Italy, are considering similar measures.

Water policies still too supply-focused

To meet growing demand, national strategies essentially rely on the extension of water supply and on major waterworks to enhance resource management and reduce risks resulting from natural constraints – 1,200 large dams are already recorded in the sole watershed area. The supply-based approach is expected to remain prevalent and lead to the following consequences (Figure 3):

Figure 3

Water supply sources in Mediterranean countries (baseline scenario)



- Increased withdrawal of renewable resources through major hydraulic projects, overexploitation of underground water and development of interregional and international transfers, while conflicts over management of shared resources, such as rivers and transboundary aquifers, could be accentuated;
- Increased "mining" exploitation of non-renewable underground water resources in the Saharan basins of several Southern Mediterranean countries. Such excessive abstraction may more than double by 2025, particularly in Libya and Algeria;
- The use of return water from agricultural drainage (Egypt) and the reuse of treated wastewater for irrigation (Spain, Israel, Cyprus, Egypt, Tunisia);
- Industrial freshwater production through desalination of seawater or brackish water, as is currently the case in Malta, Spain, Algeria and Israel.

Desalination costs have been significantly reduced and make this approach to resource supply more competitive than transfers. The use of freshwater produced in this way is no longer limited to satisfying drinking water requirements, but may also be used for irrigation, until now considered as too expensive. Spain already ranks first in the use of desalinated water for agriculture – over 22% of production worldwide. However, the total volume of treated wastewater and of desalinated water is expected to account for only 25km^3 in 2025, 90% of which in Egypt with the recycling of agricultural drainage water.

The continued application of policies focused on extending supply and pursuing abstraction, using and constantly deteriorating natural resources, represents severe risks in the long-term,

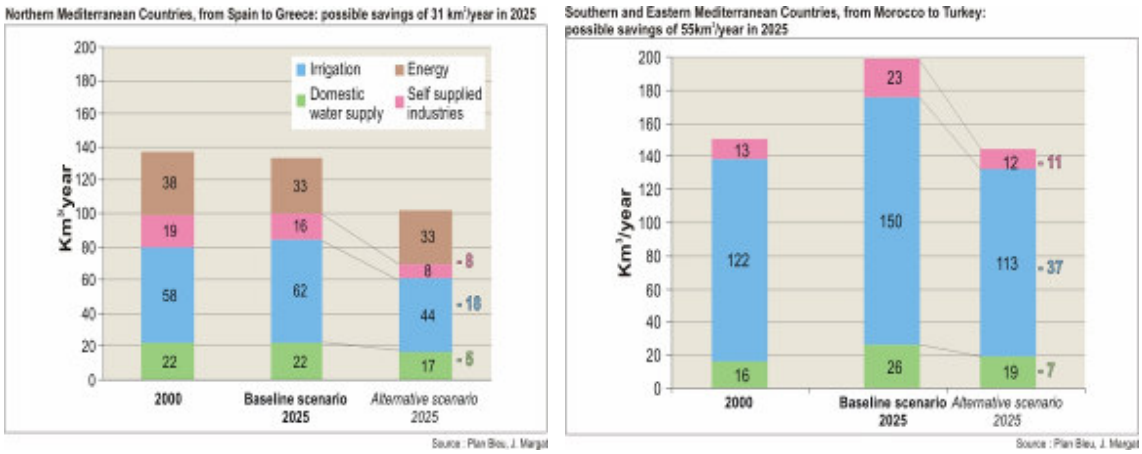
such as the rapid depletion of some fossil resources, the destruction of coastal aquifers through seawater intrusion, the degraded quality of water and aquatic systems, reduced flows and the drying-up of wetlands. The factors of increasing "water vulnerability" (production costs, conflicts, sanitary risks) could be aggravated. Supply-based policies are therefore reaching physical, socio-economic and environmental limits, as demonstrated in the South and East by the current condition of dams, where silting will probably reduce most of their capacity (in Algeria, some reservoirs have already lost 25% of their initial capacity).

Saving a quarter of water demand

Because water management is also a political issue, current trends may be inverted, through policies aimed at improving efficiency of use and at further reducing losses and poor usage (waste, leaks exceeding 50% in some cities).

There is considerable room for progress since *improved water demand management* (alternative scenario) would make it possible to save 25% of water demand, i.e. approximately 86km^3/year in 2025 (Figure 2 and Figure 4).

Figure 4 Water demand per sector, baseline and alternative scenarios, entire countries



Irrigated agriculture represents the largest potential for volume savings, with nearly 65% of total water potential savings identified in the Mediterranean (transport losses reduced by 50%, down to 10%, irrigation water efficiency increased from 60% to 80%). A further 22% in water savings potential can be expected from *industry* (recycling rate up to 50%), and another 13% from *drinking water* supply (transport losses and household leaks reduced by 50%, respectively down to 15% and 10%).

According to this optimistic view, assumed to be generalized throughout the Mediterranean countries, total water demand would level off at 102km^3/year in the North and at 144km^3/year in the South and Middle East, globally equivalent to the drop in total current demand of approximately 40km^3/year (figure 2).

These global estimates, based on concrete experiences carried out in certain countries (insert), show that current trends can be inverted.

Water-saving policies in Tunisia and Morocco

Tunisia has implemented a national water-saving strategy for irrigation, which includes the creation of user associations, pricing aimed at progressive cost recovery, targeted financial instruments for water-efficient farming equipment, and support to farmer revenues. Since 1996, this policy has stabilized irrigation water demand despite agricultural development, and the needs of both the tourism sector (a source of foreign currency) and cities (a source of social stability) have been assured.

In Morocco, increasing water demand in Rabat-Casablanca has been slowed down noticeably during the past fifteen years despite high urban growth. Improved water management (reduction of leaks, progressive pricing, systematic metering, major public awareness campaign) has deferred or perhaps completely avoided some costly investments (dams, transfer canals) initially planned in the 1980 Master Plan, while satisfying the needs. These investments, which are difficult to finance without extra debts, may prove to be unnecessary in the long term.

The challenge of water demand management is not only limited to physical savings. It also means improved economic and social enhancement of mobilized resources and the coverage of water requirements of ecosystems. In Northern Rim countries, rather better endowed with water and where demand is falling, resource quality is prevalent, on a par with the interest in maintaining or restoring ecosystems, generating lesser water supply costs. In the South and East, where countries are facing both the squeeze from limited water resources and the rapidly increasing demand, quantitative aspects are still the main issue.

The necessary reforms to invert current trends

The transition from the baseline scenario to a sustainable development scenario can only be gradual, carried by the indispensable policy reforms posting clear integrated water resource management objectives in all policies – particularly in agricultural ones – and generating the means for implementation, based on the development of sustainable efficiency plans and financial mechanisms.

In this context, both the financing of investments in drinking water supply and sanitation infrastructures (in the South and East) and the recourse to economic instruments such as subsidies and pricing to optimize allocation of available resources, appear crucial for the future. The same applies to strengthening management capability, particularly at local level. Regional cooperation, based on a long-standing tradition in water in the Mediterranean, can certainly contribute as catalyst to accelerate the emergence of the required changes.

Sources

Plan Bleu (2005). *A Sustainable Future for the Mediterranean. The Blue Plan's Environment and Development Outlook*, edited by Guillaume Benoit & Aline Comeau. London: Earthscan. Chapter on "Water", pp. 69-108. www.planbleu.org
Margat, J., Plan Bleu (2004). *L'eau des Méditerranéens: situation et perspectives.* Athens, MAP Technical Report Series no 158. www.unepmap.gr
FAO (2000). *Agriculture: toward 2015/2030*, Global perspective studies unit, April

Status of Desertification in the Mediterranean Region - Prof. Uriel Safriel, Hebrew University of Jerusalem.

Unlike popular belief, desertification is not the process through which a desert takes over a formerly non-desert area. Rather, by definition of the United Nations Convention to Combat Desertification, desertification is land degradation confined to drylands, and land degradation is expressed by a persistent reduction of the land's biological productivity, be it that of rangeland, cultivated land and woodland in the dryland areas. Drylands constitute a wide range of ecosystems, qualified by a climatic water deficit, meaning that the potential evaporation from the land surface is much greater than the amount of rainfall reaching the land.

Drylands cover about 40% of the global land surface and about third of humanity lives there. Depending on how little is the rainfall and how strong the evaporation is drylands constitute an aridity gradient – the hyperarid and arid ones are desert drylands, and the semiarid and dry subhumid are non-desert drylands. Taken together, the average productivity of the drylands (expressed in annual plant biomass production) is lowest as compared to all other land ecosystems (excluding polar ones), but at the same time poverty (expressed by infant mortality rate) is highest in drylands as compared with all other ecosystems.

Desertification, expressed as a percentage of desertified dryland, exhibits a hump-shaped curve, with a peak at the transition from the non desert to the desert drylands. Such a curve is derived by a model in which desertification is a function of the product of the linear ecosystem's sensitivity to impact, and the exponential population density, as functions of aridity. It thus follows that human impact generates a further reduction of productivity, to down below the inherently low natural productivity of the drylands. Many support the notion that this impact, expressed in overuse of land resources drives desertification. Either the low dryland productivity or desertification is implicated as the drivers of dryland poverty. However, there is some evidence to suggest that in some areas the challenge of living in the drylands induces in dryland people social and technical ingenuity that enables them to circumvent and avoid desertification and poverty.

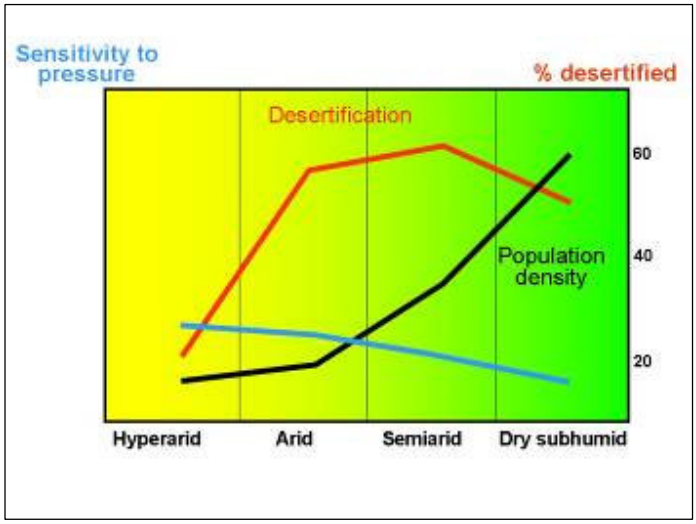


Fig 1. Desertification and Population Density

As other Mediterranean climatic regions in the world, the Mediterranean basin is characterized by rainfall that is restricted to one season, but this is winter in which evaporation is low. It has a very strong spatial mosaic of soil types. Most drylands around the Mediterranean Sea are semiarid and dry subhumid, i.e. of high desertification risk. But

countries of the southern Mediterranean basin have also lot of desert drylands, which are less sensitive to desertification. However, population pressure is mounting all around the Mediterranean Basin, and in the southern Mediterranean countries most population growth is contributed by the rural sector, which increases the risks of desertification in these countries.

Given also the global population trend that will consume all the good cultivable land on earth, thus putting more pressure on the drylands' marginal lands, the future of the Mediterranean dryland people if they are to subsist on land productivity alone, is bleak. To this should be added the projected detrimental effect of global climate change on the Mediterranean drylands, which would transform non-dryland areas to drylands, and would further increases the risk of desertification in the current dryland areas.

A gradual shift from traditional to alternative dryland livelihoods may be solutions for reducing the Southern Mediterranean desertification risks and poverty. In this context a linkage between the southern and the northern Mediterranean countries may prove to be mutually beneficial.

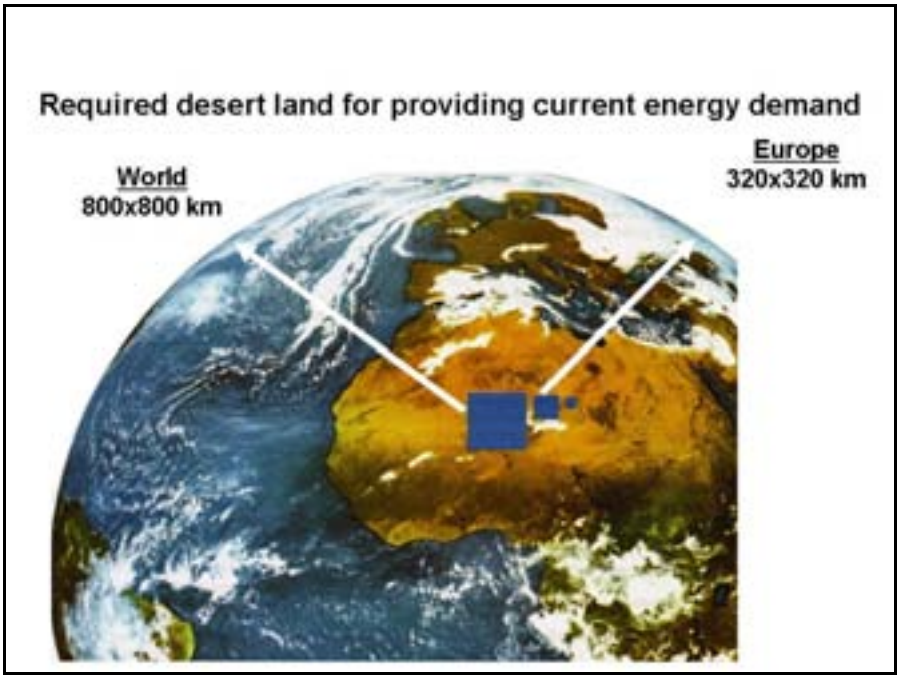


Fig 2 Required desert land for providing current energy demand

The desert drylands of the southern Mediterranean can be used to generate solar energy exported to the northern Mediterranean basin, what can boost the economy of the southern Mediterranean drylands. Also tourism, from north Mediterranean countries to south Mediterranean drylands can be very attractive and constitute a lucrative alternative dryland livelihood, provided that its benefits reach the local dryland inhabitants.

Reviewing Land Use and Security Aspects in the Mediterranean Region - Prof. Winfried E.H. Blum, University of Natural Resources and Applied Life Sciences, Vienna

Summary
Impacts of land degradation, desertification and water scarcity in the Mediterranean region on technical, social, economic and cultural environments are discussed under security aspects, including additional risks caused by climate change, and possibilities of mitigating security problems by bridging between science, politics and decision making.

1. INTRODUCTION

Before reviewing land use and security linkages, it seems necessary to define some of the basic terms.

"Land" normally means a physical entity in terms of its topography and spatial nature, including natural resources such as soils, minerals, water and biota, that the land comprises (UNEP, 2001). – Soils are part of land, forming the uppermost crust of the earth.

Under "land use" three ecological and three technical, social and economic uses can be distinguished (Blum, 2005, Frossard et al. 2006).

The ecological uses are:
- production of biomass, ensuring food, fodder, renewable energy and raw materials through landscaping, agricultural and forest activities, gardening, and others.
- collection of rainwater, filtering, buffering and transforming it into ground water or even drinking water resources. Moreover, all solid, liquid and gaseous, inorganic and organic compounds, e.g. pollutants deposited on land can be mechanically filtered, physico-chemically buffered and microbiologically and biochemically transformed by soils, thus protecting the food chain, as well as the ground water against contamination.
- Soil as a biological habitat and an enormous reserve of genes, larger than all above ground biota together, and therefore most important for the maintenance of biodiversity and the biological functioning of terrestrial ecosystems.

The three technical, industrial and socio-economic functions comprise
- land as a physical base for technical, industrial and socio-economic structures and their development, e.g. industry, housing, transport, sports, recreation, dumping of refuse etc.;
- land and soil as a source of raw materials, such as clay, sand, gravel and others, for implementing such structures , as well as a source of water and geogenic energy;
- land and soil as a geogenic and a cultural heritage, forming an essential part of the earth's surface and concealing palaeontological and archaeological remnants of high importance for the understanding of the history of the earth and of humankind.

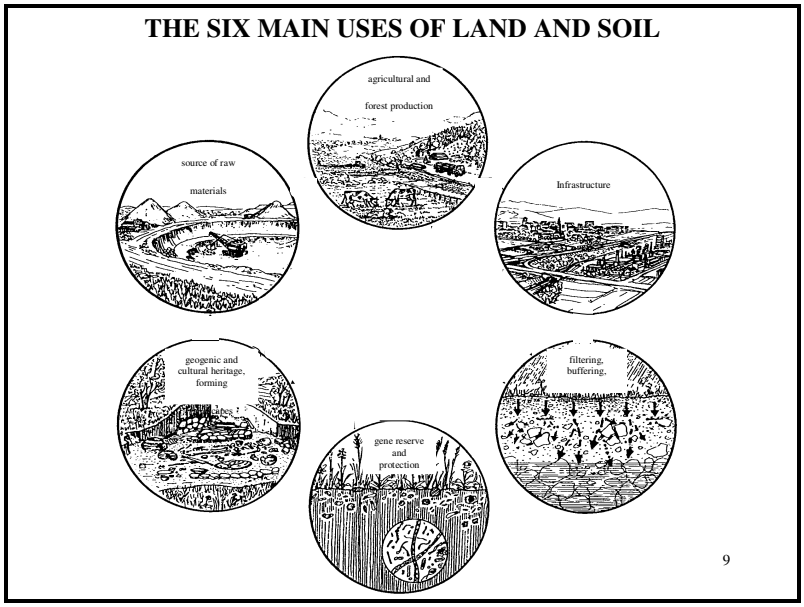


Fig. 1: The 6 main uses of land and soil

These 6 main uses are shown in Fig. 1. From this figure, it becomes evident that we are simultaneously using all these functions, which causes problems through the competition between the uses.

"Security linkage" means that security problems can arise from two different kinds of impacts:
- **natural environmental events**, e.g. natural disasters, such as extreme meteorological conditions, forest fires, landslides and others;
- **human induced environmental impacts**, such as the depletion of natural resources, especially of soil and water, the loss of biodiversity, the sealing of land by urbanisation, industrialisation and tourism, and as an overall result of human activities, the climate change, which is the global result of innumerable locally defined processes.

In the following, mainly human induced impacts will be discussed, which are mostly complex and show environmental, technical, social, economic and also cultural dimensions.

For impacts as well as for security problems, two parameters are of paramount importance:
- the dimension of space, which means the spatial scale, e.g. of urbanisation, of soil contamination, landslides, forest fires and others, and
- the dimension of time, which means the pace with which the impact-driven processes occur. For example, it is very important if sealing of large areas by urbanisation occurs within a few years or in decades.

Two types of security linkages will be discussed in more detail:
- security problems resulting from land degradation and desertification, and
- security problems deriving from water scarcity.

2. SECURITY PROBLEMS CAUSED BY LAND DEGRADATION AND DESERTIFICATION

2.1 Land degradation

Land degradation is mainly caused by two types of unsuitable land use:
- use of land which excludes all the other uses, e.g. sealing of land through urbanisation;
- unsustainable use of single land functions, e.g. unsustainable agricultural land use or industrial activities causing emissions of toxic compounds.

The exclusive competition between the 6 functions and uses of land becomes visible by comparing Europe's natural resources at daytime with Europe's built environment at night, showing that large parts of Europe are sealed by urbanisation, industrialisation and transport, from which emissions are released on the adjacent land surfaces (see Fig. 2 and 3, Blum et al., 2004).

Fig. 2: Europe's natural resources

Fig. 3: Europe’s built environment

Fig. 4 gives a detailed view on the increase of artificial area in coastal zones between 1975 and 1990 in % and the projected increase in urban population between 1990 and 2025 and (EEA, 2001). These pictures indicate that sealing is impeding all other land uses, the ecological as well as the technical, social and economic ones. Fig. 5 shows in more detail the process of sealing of a landscape in southern Germany, with towns, villages and roads of first and second order, connecting urban and peri-urbain settlements at a scale which is indicated in the picture.

Sealing at large extent is typical for urban agglomerations, taking Cairo, the largest city of Africa, as an example (see Fig. 6).

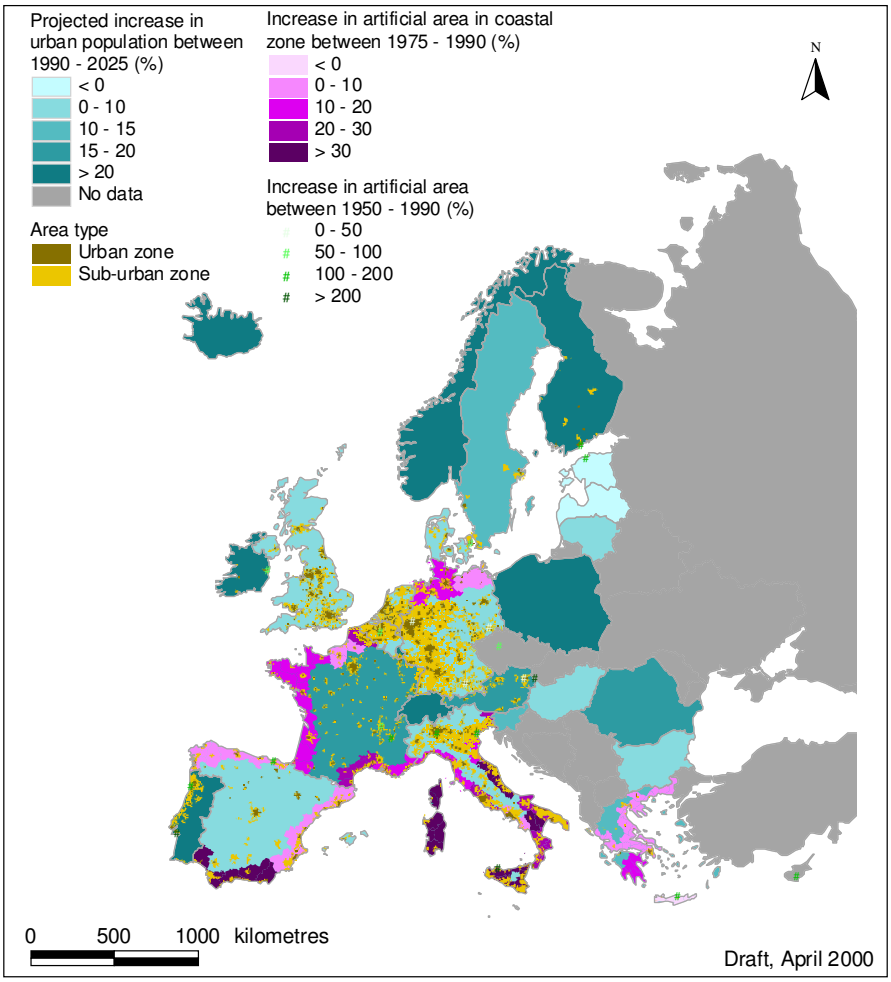


Fig. 4: Land use changes in coastal areas and projected increase in urban population (EEA, 2001)

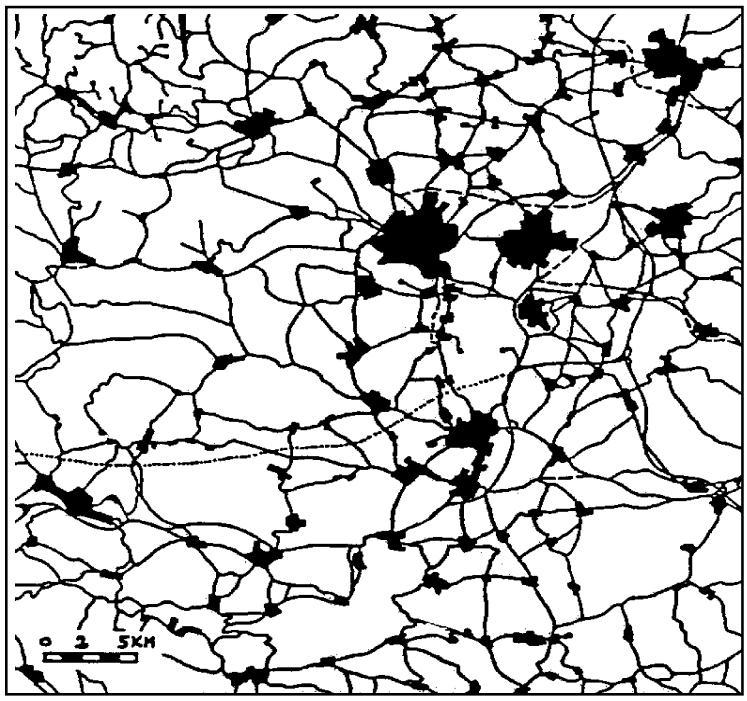


Fig. 5: Sealing of soils and landscapes by settlements and roads, observe the scale in the left lower corner (Example: south-western part of Baden-Württemberg, Germany)

20

Fig. 6: View of Cairo from the Citadel (Photo: Blum, 2002)

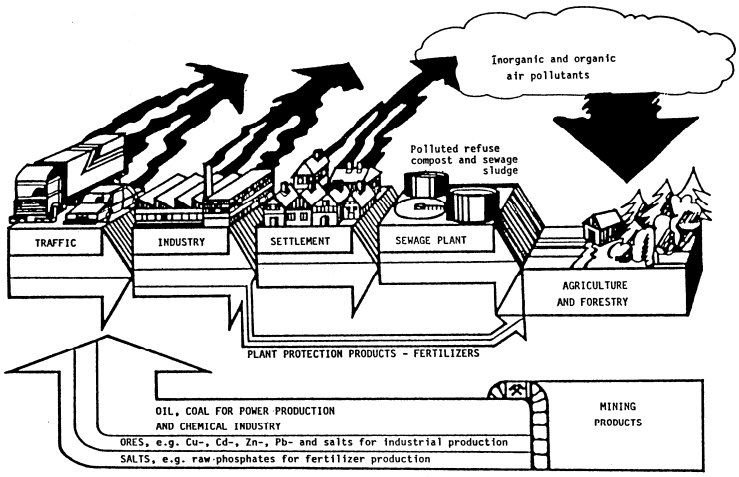
Security problems caused by sealing, e.g. urbanisation, industrialisation, transport and tourism are two-fold:

1) ecological-technical problems are:
- impedance of rainwater infiltration, causing surface runoff, with the danger of flooding and the loss of rainwater storage in areas where this water would be urgently needed;
- high evaporation and water losses to the atmosphere from urban surfaces, sealed by asphalt, concrete and other dense material, e.g. roofs, streets, parking lots etc.
- increased temperature levels, due to storage of radiation energy in the constructions;
- production and accumulation of refuse and emission of dust and gases;
- increased demand for water, in competition with other uses, e.g. agriculture. –

Therefore, large touristic areas in the Mediterranean Basin can cause security linkages.

2) social, economic and cultural constraints are caused by:
- the disappearance of natural landscapes, formerly used for agriculture or forestry;
- loss of livelihood through the loss of crop and pasture land
- emergence of new social groups with problems of integration into the existing social and economic environments.

Besides sealing as an exclusive form of competition, urban and peri-urban agglomerations cause important impacts through physical and chemical loads on the adjacent agricultural and forest lands, on the atmospheric pathway, on the waterway and through terrestrial transport (see Fig. 7). These processes are still going on and were even accelerating in the last decade, contaminating land and water surfaces with heavy metals and toxic organics in an intensity which never existed before (Blum, 1998, 2006).



Soil pollution through excessive use of fossil energy and raw materials (Blum 1988)

Fig. 7: Contamination of land and soils through excessive use of fossil energy and raw materials (in: Blum, 1998)

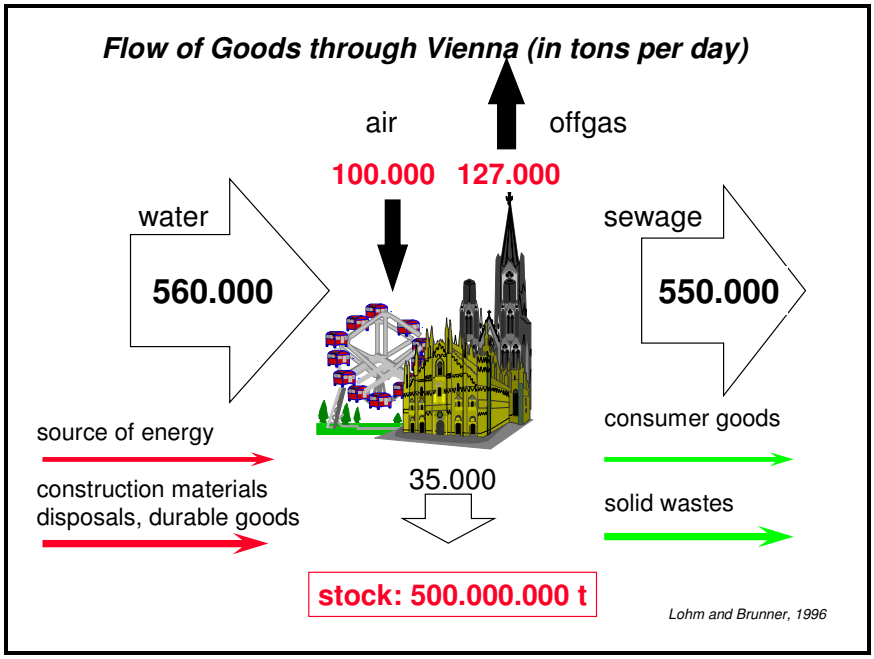


Fig. 8: Flow of goods trough Vienna in tons per day (in: Blum, 1998)

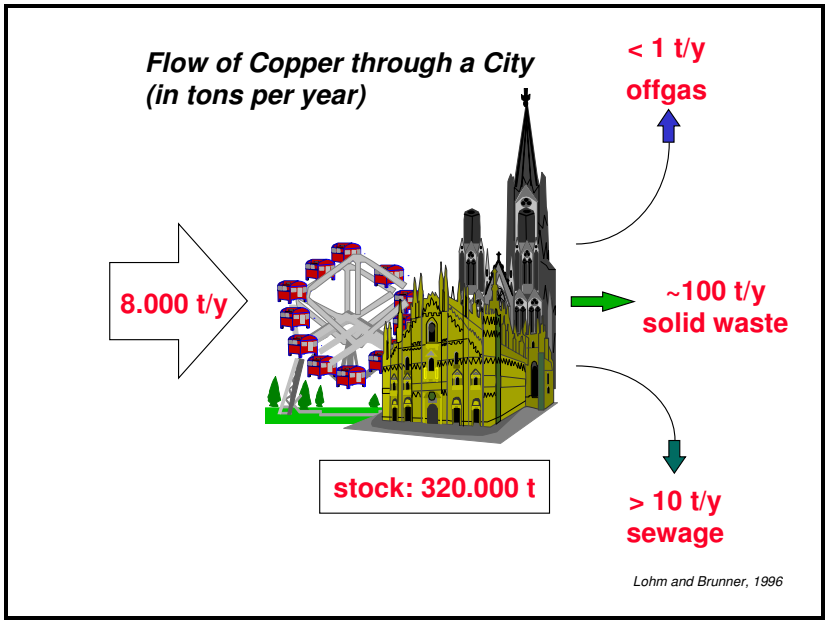


Fig. 9: Flow of copper through a city (in tons per year) (in: Blum, 1998)

The impact of urban agglomerations on the adjacent agricultural land is shown in figures 8, 9, 10 and 11. The flow of goods through Vienna in tons per day (Fig. 8), is evidence to the fact that even cities like Vienna, with a very low level of industrial activity need high amounts of water and air per day, producing sewage and off-gas and are accumulating each day about 35 000 t of construction materials, disposals and durable goods within the city area.

Looking only at the flow of copper in tons per year (Fig. 9), reveals for a city like Vienna, which may have a total stock of 320 000 t of copper contained in roofs, tiles, tubes and other construction materials, that every year 8 000 t of Cu are added, of which only a small portion is leaving the city as off-gas (about 1 t), in the sewage (about 10 t) and as solid waste (about 100 t). 7 889 t remain in the city, which becomes with time a "chemical time bomb".

Analysing the distribution of copper in the surroundings of Vienna shows a clear impact of the city on the adjacent agricultural areas east of Vienna, for which the soil sampling sites for copper analysis are shown in Fig. 9. The soil analytical data reveal a clear relationship between the distance from downtown Vienna and the copper content of the uppermost soil horizons (0-20 cm), which can be seen in Fig. 10.

Even considering that this degree of contamination is not alarming, it clearly shows the impact of urban activities, which is also visible for zinc in the same Fig. Zn is used for protecting all kinds of ferric material against rusting. - In conclusion, cities are not only areas of high accumulation and turnover of goods, but also sources of contamination for the adjacent environments.

Fig. 10: Soil sampling sites east of Vienna (in: Blum, 1998)

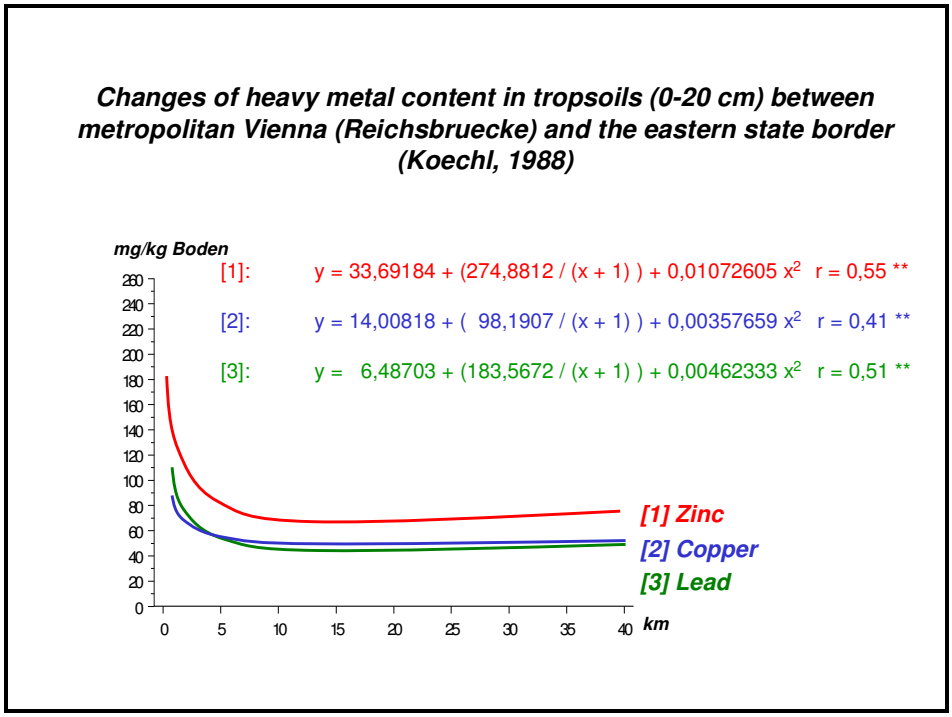


Fig. 11: Heavy metal contents in agricultural topsoils (in Blum, 1998)

Such and similar impacts can trigger conflicts, see also the deposition of refuse from urban agglomerations, which normally occurs somewhere in the adjacent surroundings.

Further impacts of land use can be caused by unsustainable agriculture. Fig. 12 shows impacts on soil through compaction, accumulation of contaminants, e.g. pesticides, through the use of manures and fertilisers, sewage sludge deposition, through soil erosion, loss of organic matter and others (Blum, 2007a). Unsustainable agricultural land use through the centuries can ruin entire landscapes, as can be seen in a landscape in North Africa, see Fig.13.

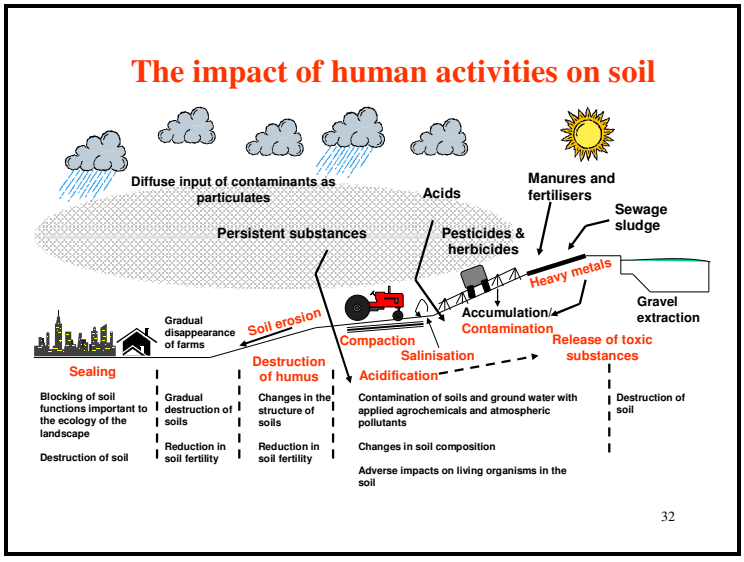


Fig. 12: Impact of human activities on soil (IES, JRC, Ispra)

33

Fig. 13: Soil erosion control in badlands (Photo: Blum, 1986)

2.2. Desertification

Desertification is a special form of land degradation, occurring under arid and semi-arid climatic conditions, characterized by a lack of rainfall during long periods of the year and a deficit in the annual water balance. Those areas are specifically vulnerable to land degradation caused by forest fires, overgrazing, agricultural cropping, or urbanisation and industrialisation (Blum, 2006).

A special problem in areas with water deficit is salinisation through irrigation without sufficient drainage. Further problems occur through imbalanced water availability in upstream and downstream areas of water reservoirs. People upstream often have limitations in land use in order to avoid erosion and sedimentation of the water reservoir, whereas people downstream are profiting from the water accumulated by the dams. Under such conditions, conflicting interests exist, which have to be solved by politics and decision making.

Recently, new conflicts arose through the competition between the production of food and biofuels, such as ethanol and biodiesel, aggravated through water scarcity, as water is needed for both production lines.

2.3 Classification of impacts in order of urgency

Classifying impacts in order of urgency, shows that land and soil losses through sealing, mining of soil materials, soil erosion by water and wind, as well as intensive pollution of soils by heavy metals, xenobiotics, radioactive compounds, by advanced soil acidification and salinisation and deep reaching soil compaction are irreversible. Irreversible means that these damages cannot be reversed in a time span of about 100 years or 4 human generations.

In contrast, reversible damages or threats are soil pollution by biodegradable organic compounds, and problems due to superficial compacting, glazing and other physical deterioration of topsoil structures, see also Blum, 2007b.

This classification is important for defining priorities in combating security problems which may increase or accelerate with time, thus causing large scale security issues.

3. SECURITY PROBLEMS RELATED TO WATER SCARCITY

Water scarcity is typical for countries of the Mediterranean Basin, due to its specific climatic conditions. Competition in the use of the scarce water resources already exists in areas with intensive agricultural irrigation, which consumes on the average more than 70% of all available water resources and leaves only 30% or less for domestic and industrial purposes, not counting the high water losses though deficient water distribution systems such as pipes, where often up to 25% of all available water is lost.

Under those conditions, touristic activities during the dry season with high demands for water come into in conflict with the need of the local population especially for gardening and agriculture. Moreover, unsustainable water use through agriculture, e.g. with insufficient irrigation techniques cause loss of water reserves and salinisation, with additional adverse impacts on estuarine and coastal environments.

In some Mediterranean regions, we observe increasingly that rivers are no longer deserving the groundwater resources. On the contrary the groundwater resources are providing water for the rivers, which is a strong signal that the water balance in these regions is heavily disturbed.

These processes are part of the desertification and can raise severe security issues, because under the prevalent and possible future climatic conditions, the results may become irreversible and may therefore endanger the living basis of large parts of the population.

4. CLIMATE CHANGE AND FUTURE RISKS

Looking into the IPCC scenarios up to 2100, it becomes clear that not only the CO_2 emissions, but also the CO_2 increase in the atmosphere and the resulting temperature rise are severe threats, see Fig. 14, especially to the Mediterranean region, see also Steffen et al., 2004.

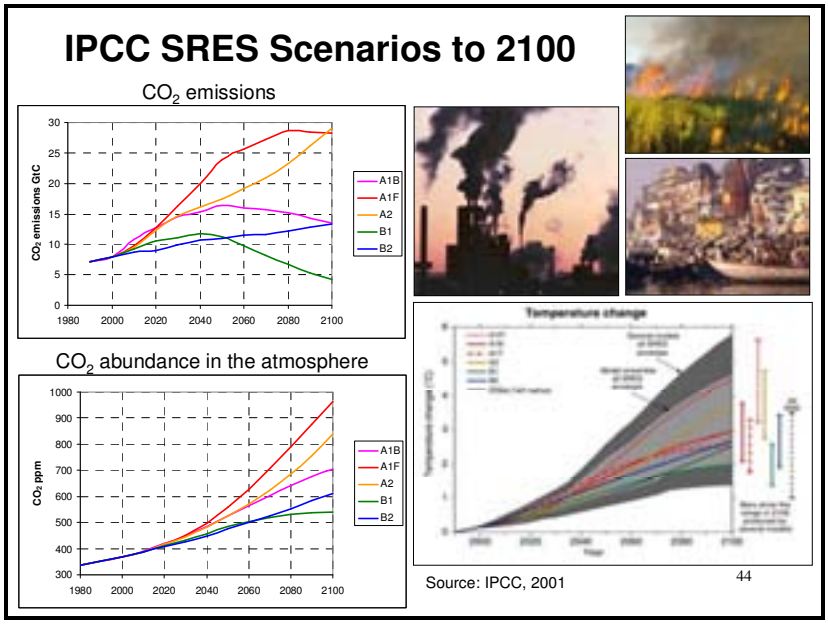


Fig. 14: IPCC SRES Scenarios to 2100 (IPCC, 2001)

Specific changes are shown in the figures 15 and 16, indicating the mean annual temperature changes for 2071-2100, relative to 1990, as well as the change in the mean annual precipitation for the same time period (IPCC, 2001). These figures reveal that the mean annual temperature of the Mediterranean Basin will increase, whereas the mean annual precipitation will decrease.

Considering the share of irrigated land in arable land in the Mediterranean Basin (Fig. 17), makes clear that in the Mediterranean Basin several countries, e.g. Egypt, which is nearly totally depending on irrigation, will severely suffer from the decrease of water reserves, see also Parry et al., 2004.

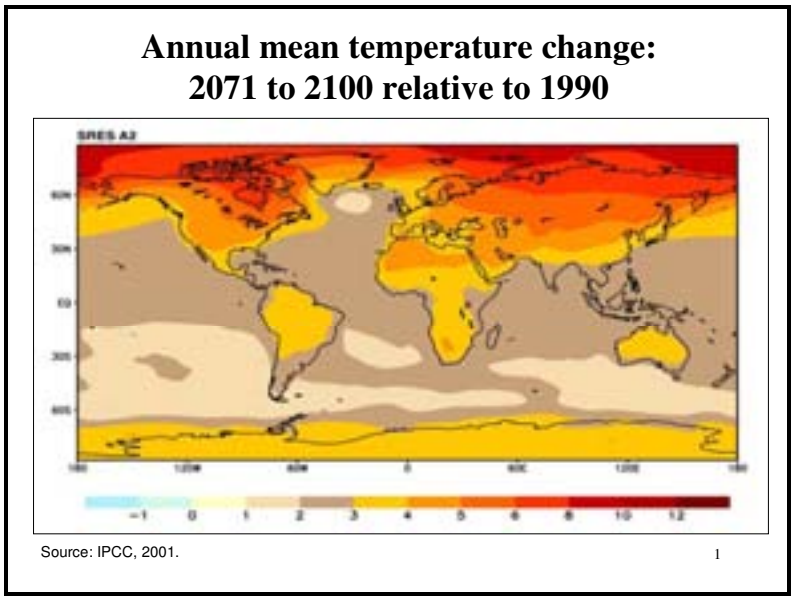


Fig. 15: Annual mean temperature change: 2071 to 2100 relative to 1990 (IPCC, 2001)

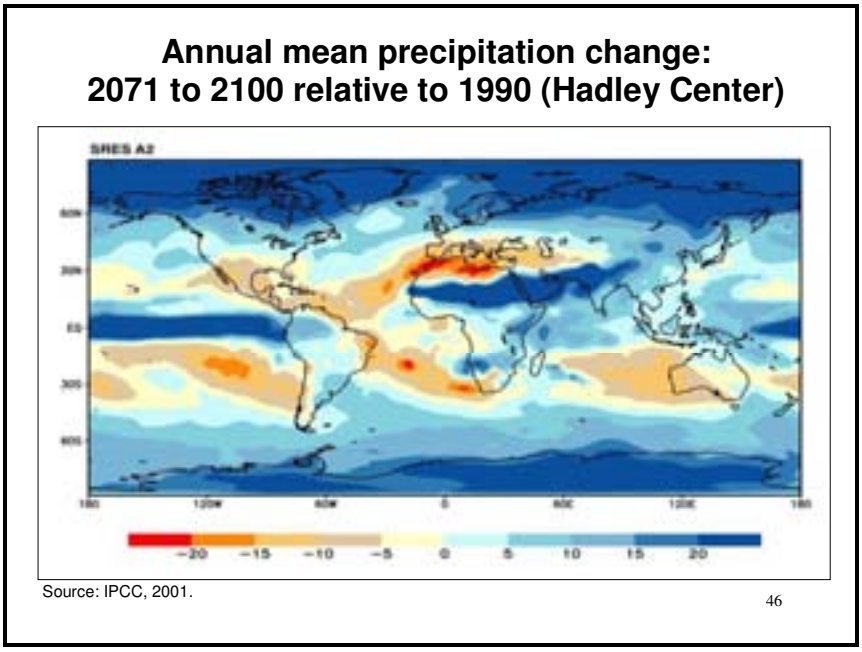


Fig. 16: Annual mean precipitation change: 2071 to 2100 relative to 1990 (IPCC, 2001)

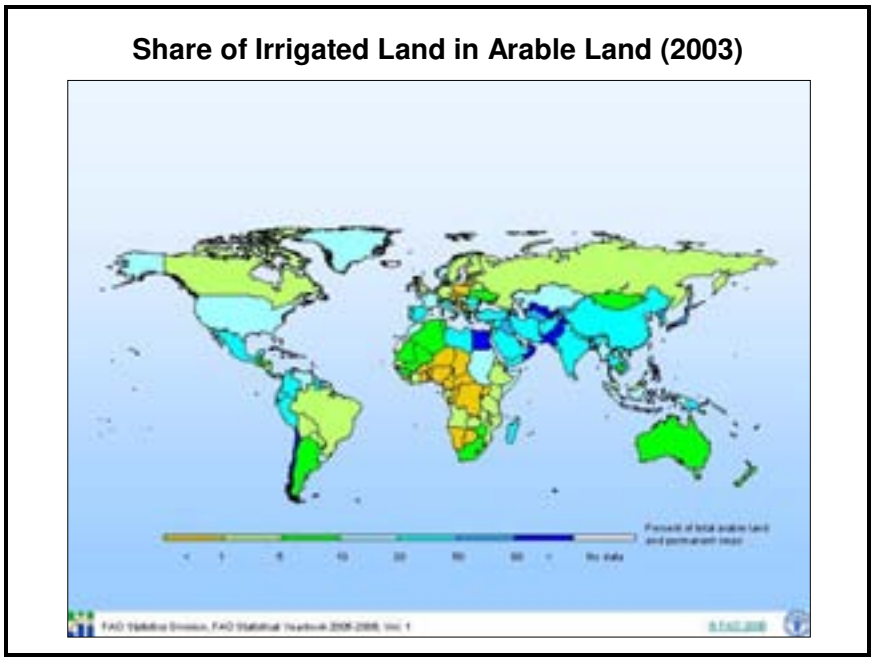


Fig. 17: Share of irrigated land in arable land (FAO, 2006)

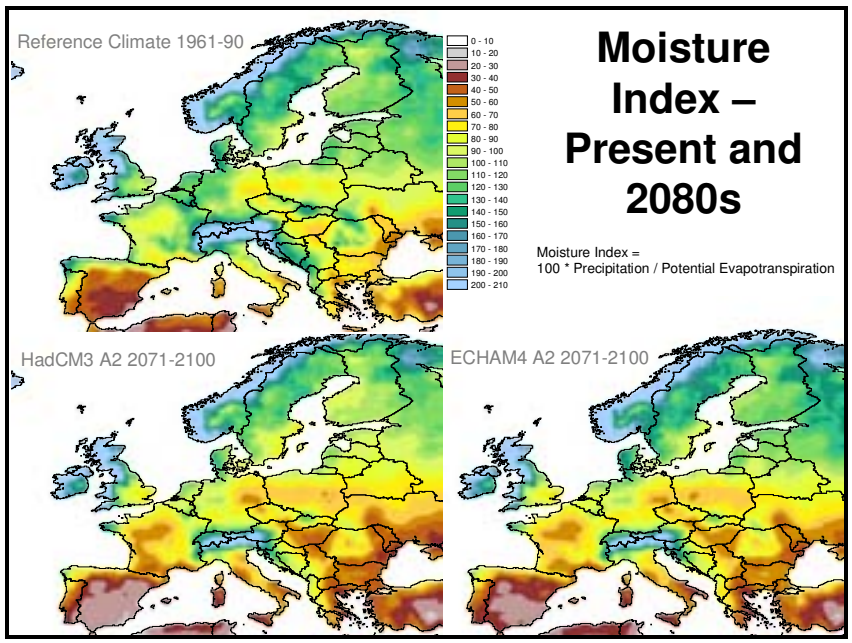


Fig. 18: Moisture Index of Europe – Present and 2080s (Fischer et al, 2005)

Looking into the moisture index from present to 2080 (Fig. 18), reveals clearly that the Mediterranean Basin will become dryer in the next decades, which means that conflicts about water availability may arise due to the increase of water scarcity.

5. SOLVING SECURITY ISSUES BY BRIDGING BETWEEN SCIENCE, POLITICS AND DECISION MAKING

Impacts on social and economic systems caused by land use and water scarcity and resulting conflicts have to be controlled by politics and decision making.

However, sustainable use of land, e.g. through spatial and/or temporal harmonisation of the uses in a given area, avoiding or minimising irreversible impacts, as well as the socially and economically balanced distribution of water resources is not a scientific but a political issue (Blum, 2006, 2007a,b). Two decision patterns can be distinguished:
- top-down decisions, in which the top-ranking deciders are managing the basis, or
- bottom-up approaches, in which the local population formulates its demands and asks the leaders to take action.

As expressed before, all land use and water scarcity issues are complex, showing ecological, technical, social, economic and cultural dimensions. Therefore, it is necessary to define indicators which can be used as information basis for understanding and managing these complex systems. Such indicators can be cultural, social, economic or technical ones. Examples for ecological indicators are: soil quality, water quality, biodiversity, human health and others; technical indicators: access to the land, availability of tools and others; social and economic indicators: economic wealth and access to social resources; a cultural indicator could be the educational level in a region (Blum, 2004).

The criteria for those indicators are fourfold:

- they must be policy-relevant and focus on real demands;
- they must by analytically sound, based on science and revealing a clear cause-response relationship;
- they must be easy to interpret and understandable for farmers and stakeholders at the grass-roots level, as well as for decision makers and politicians; and finally
- they must be easily measurable and therefore feasible and cost effective in data collection, data processing and dissemination.

With the help of indicators, it should be possible to mitigate and alleviate future security problems, thus diminishing security linkages caused by land use and water scarcity in the Mediterranean region.

6. REFERENCES

Blum, W.E.H.: Soil Degradation Caused by Industrialization and Urbanization. In: Blume H.-P., H. Eger, E. Fleischhauer, A. Hebel, C. Reij, K.G. Steiner (Eds.): Towards Sustainable Land Use, Vol. I, 755-766, Advances in Geoecology 31, Catena Verlag, Reiskirchen 1998.

Blum W.E.H.: Soil Indicators for Decision Making – Sharing Knowledge between Science, Stake Holders and Politics. 13th International Soil Conservation Organisation Conference, 4-8 July 2004, Brisbane/Australia – Conference Proceedings (CD), Paper No. 202, pp. 1-5, Brisbane 2004.

Blum W.E.H.: Functions of Soil for Society and the Environment. – Reviews in Environmental Science and Biotechnology, 4, 75-79, 2005

Blum W.E.H., D.Barcelo, J. Büsing, T. Ertel, A. Imeson, J. Vegter: Scientific Basis for the Management of European Soil Resources – Research Agenda, 18 pp., Verlag Guthmann-Peterson, Wien 2004 (ISBN 3-900782-47-4).

Blum W.E.H.: Urban and peri-urban environments: emerging frontiers in soil and water conservation. E.S.S.C. Newsletter 3, 16 – 23, Wolverhampton/UK, 2006.

Blum W.E.H.: Role of soils in river basin management. RiskBase 1st Thematic Workshop, May 17-18, 2007, Lisbon, Portugal, pp.15-18. – IIQAB-CSIC, Barcelona, Spain 2007.

Blum W.E.H.: From vulnerability to resilience – Search for new concepts, explaining the need for integrated risk-based management of the water-sediment-soil system at river-basin scale – RiskBase-Newsletter 1, p. 2, Oct. 2007, TNO, Utrecht/NL, 2007b.

EEA: Environmental signals 2001. Environmental assessment report No. 8. European Environment Agency, Copenhagen, 2001

FAO Land and Water Digital Media Series 11. – Global Agro-ecological Zones, Version 1.0. – IIASA Science for Global Insight, 2006.

Fischer G., Shah M. Tubiello F.N., Van Velhuizen H.: Socio-economic and Climate Change Impacts on Agriculture: An Integrated Assessement, 1990-2080. – Philosophical Transactions of the Royal Society B; doi:10.1098/rstb2005.1744 Published online.

Frossard E., W.E.H. Blum, B.P. Warkentin (Eds.): Function of Soils for Human Societies and the Environment. Special Publication No. 266, Geological Society, London, 2006 (ISBN 978-1-86239-207-6).

Parry M.L., Rosenzweig C., Iglesias A., Livermore M. and Fischer G. – Effects of climate change on global food production under SRES emissions and socio-economic scenarios. – Global Environmental Change 14, 53-67, 2004.

Steffen W., Sanderson A., Tyson P.D., Jäger J., Matson P.A., Moore III B., Oldfield F., Richardson K., Schellnhuber H.J., Turner II B.L., Wasson R.J.: Global Change and the Earth System – A Planet under Pressure. – Springer-Verlag Berlin Heidelberg New York, ISSN 1619-2435, ISBN 3-540-40800-2, 2004.

UNEP: Global Ministerial Environment Forum Policy Issues: State of the Environment – UNEP's Policy on Land and Soil . – UNEP/GC21-IDF-13, January 2001, Nairobi.

Water scarcity and Desertification as a Security Challenge in the Mediterranean Region - Dr. José L. Rubio, Centro de Investigaciones sobre Desertificación – CIDE – CSIC. Valencia

Introduction

The protection of our finite and shared environment is progressively coming to people's attention as an unavoidable prerequisite for equitable development, in order to avoid conflicts and to prevent disasters related to environmental security. The Euro-Mediterranean Region is also immersed in this general trend partly as a consequence of more frequent severe environmental events, such as forest fires, floods and landslides, droughts, torrential rains, heat waves and water scarcity. The Southern and Eastern shores of the Mediterranean undergo even more severe environmental impacts affecting the stability of the land, its capacity to produce food and the lack of water resources. These environmental conditions are the origin of recurrent famines, social marginalization, conflicts and forced population displacement.

Security is of utmost importance for man and gives him a feeling of protection against harm, danger, fear or anxiety. The human pursuit of security is a prerequisite and a strong motivation for survival. It is basic and consubstantial for man. From the initial aspect of physical security, the term has evolved during human and social evolution to a pleiad of very different scopes including the recent consideration to environmental aspects. Brauch (2003) offers a clear and concise review of the evolution of the concepts of security. This review includes references to traditional intellectual schools (Hobbesian-Machiavellian, Kantian and Grotian), theories on war, peace, conflict; critical security studies, constructivist and deconstructivist approaches, liberalism and postmodernism. He also refers to others concepts as common security, mutual security, cooperative security and security partnership.

In the last decades of past century institutions like the UNESCO and the FAO have played important roles in changing the scenario. Also, at the academic level the term expanded to include environmental aspects (Buzan, 1998). The Brundtland Report on Sustainable Development of 1987 included an early chapter on environmental security. After that, conceptual and perception evolution security risks, other than military threats posed by others states, have been included in the agenda, such as environmental degradation, socio-demographic challenges or the spread of infectious diseases. Also the UNDP in its Human Development Report (1994) introduced the concept of security for people in terms of protection from poverty, disease, hunger and environmental hazards. The Canadian government defines human security as a freedom from pervasive threats to people's rights, safety and lives.

In some ways, this new vision of human security is a return to the early times of humankind in which security was mainly a physical and individual need. In 1996 the FAO introduces the concept of food security as "the access for all people at all times to enough food for an active, healthy life" (FAO, 1996).

Today there is a growing acceptance of the linkages between environmental disruptions and conflicts. This new issue on the arena requires new appraisals and new responses far from of the traditional military approaches to conflicts. Meanwhile, environmental threats occur at a

local or a regional scale, the implications and consequences of which could be have a transboundary dimension or could even be considered as an international problem. This dimension calls for the building up of new cooperation schemes and for approaches towards global equity as a basic appraisal to cope with environmental security.

Security in the Mediterranean

Throughout history, the Mediterranean has been the crossroads for three continents and the place of the flourishment of many civilizations that have given the world important cultural, scientific and socio-economic developments for centuries. It is also a region with long records of conflicts and wars with an intriguing and intense list of historic security issues.

There are historical records of trouble with regard to environmental problems. There was river, soil and air pollution due to mining and metallurgic operations in different areas around the basin, with coin making that caused air pollution due to the large amounts of metals used, mainly cupper and lead. Some of the more important cities had early pollution problems. Maimonides (1135-1204), philosopher and physician from Cordoba, Spain, complains sadly about this early urban air pollution in cities in comparison to the rural world. The copper mines from Rio Tinto (Huelva, Spain) have been the source of vast pollution problems for centuries. Similar problems evolved from the glassmaking industry in Venice. Recently Athens has had huge problems of overgrowth and pollution.

Problems related to scarcity or to quality of water are also a permanent historic feature. Istanbul for example has been always a city with water supply problems. There are records even from the Byzantine period of enormous efforts with infrastructures (including pipes below the Bosphorous Strait) to bring water to the city and also accounts about problems of pollution and sanitation levels.

From 1990s until now the most important security concerns, in its wide acceptation, are related first to the issue of terrorism but now include the fundamentalism dimension and implications. The second issue is related to the growing dimension of the migration phenomenon that is gaining visibility with impacts in both areas of origin and of reception. The third and also growing security concern is the environmental disruption of natural resources and the implications on social and economic activities and also with the well being of persons.

Desertification

The desertification risk is an environmental problem of world-wide scope that affects the five continents. The latest consequences represent the dismantling of all the biospheferic potential of the affected zone and its conversion into a barren and unproductive territory. The process begins with the deterioration of the soil due to different degradation processes such as water and wind erosion, loss of organic matter, destruction of the structure, compaction, sealing or salinization-sodification. The effects of soil loss or the loss of its productive and ecological functions is transferred to the other components of the terrestrial ecosystem (water resources, plant cover, soil fauna and micro-organisms) in a self-feed spiral that in its last instances gives rise to a sterile and desolate landscape with irreversibility connotations. This, fortunately, only takes place when the situation is extreme. In the affected zones one can

find all kinds of situations, from zones very slightly affected to zones that show evident symptoms of deep degradation. The Mediterranean is considered as one of the areas highly vulnerable to desertification (Rubio and Recatala, 2006).

The United Nations Convention to Combat Desertification (UNCCD, 1994)), Article 1, defined desertification as land degradation in arid, semi-arid and dry-sub humid areas resulting from various factors, including climatic variations and human activities. Arid, semi-arid and dry-sub humid areas are defined as areas other than polar and sub-polar regions, in which the ratio of annual precipitation to potential evapotranspiration (P/ETo) falls within the range 0.005 to 0.65. That means areas (drylands) with large water deficits because potential evapotranspiration (ETo) is much greater than precipitation (P). Land is the terrestrial bio-productive system that comprises soil, vegetation, other biota, and the ecological and hydrological processes. Land degradation means loss of the biological and economic productivity of rainfed or irrigated cropland, or range pasture, forests and woodlands resulting from various factors, including climatic variations and human activities such as unsustainable land uses. Degradation processes includes deterioration of soil properties, soil and water erosion, long term loss of natural vegetation, reduction or loss of the biological productivity, salinization and sodification. Therefore, in the broadest terms, desertification includes the degradation of soil, water, vegetation and other resources.

The climatic induced situations of a structural negative balance of water in the drylands establish the context of the biological functioning of the land, the biomass productivity and the soil properties and capacity of use. It also establishes the status of vulnerability as a result of natural impacts (like drought) or human pressures and because of the structural difficulties of self restoration. In the initial phases of desertification process they occur unnoticed because no apparent change is observed in soil functions performance. Soil also has its own capacity to recover after impacts by its resilience capability.

Desertification and Climate Change

Soils are a living system and because of their biological component they are very sensitive to temperatures variations and water availability. This is one of the reasons why Mediterranean soils are vulnerable to climate change and the aridification trend in the drylands. Moreover, climate change and desertification are linked in a series of feedback mechanisms that affect both processes (Rubio, 2007).

The global deterioration of the soil has a tremendous effect on functioning of our Earth, for example, food production and biomass. Of special concern are the soil conditions in the driest zones of the planet (including the Mediterranean) with increasing aridification processes and, consequently, desertification. In the opposite sense, soil degradation impacts on important parameters of climatic regulation and on important biogeochemical cycles that affect the atmospheric chemical composition. Among others it is possible to emphasize: changes in the albedo characteristics, radiative forcing, soil humidity, surface roughness, evapotranspiration, emission and retention of gases with greenhouse effect (carbon dioxide, methane, nitrous oxides), changes in the condensation surfaces and the emission of aerosols and dust particles. Probably one of the most serious consequences of the tendency of global warming is the impact in the processes of land degradation-desertification of the drylands of the planet and, also, the feedback of desertification processes with an increasing tendency of climate change (Blond, 2007). One could image a perverse spiral in that the Mediterranean

soil and water degradation problems, could not only affect the stability and functioning of the natural environment, but also could involve problems with environmental security (forced migrations, water shortage, food security, diseases, heat waves, forest fires). This could also involve important damage and socioeconomic consequences during extreme weather events (droughts, torrential rains, floods and landslides). These interactions between desertification and climate change are the object of increasing attention (Williams and Baling, 1996). At the same time, scientific knowledge is required for the impact of different climate factors on different processes from degradation of the soil and its capacity to regulate climate factors to climate regulating systems (Sivakumar and Stefanski, 2007).

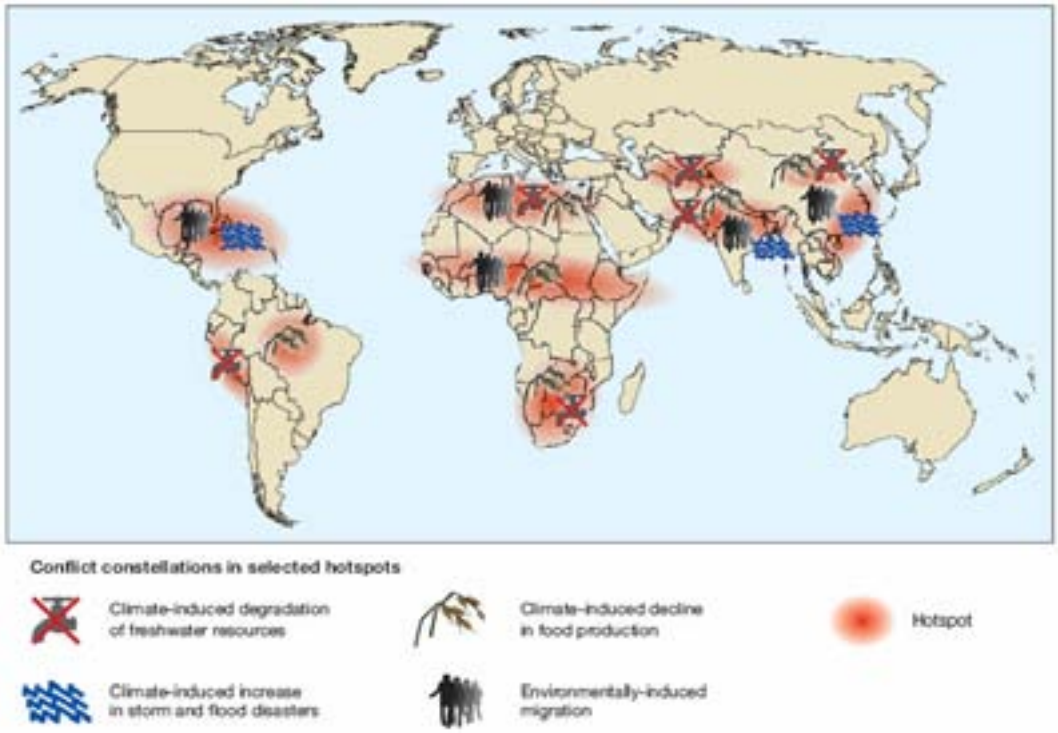


Fig 1 Scenario: constellations of conflict in areas affected by the climate change Source: German Scientific Committee on Global Environment Isues,2007

Forest fires

Nowadays wild fires are one of the most important factors increasing the risk of desertification in the Mediterranean. Fire is an ecological component of Mediterranean ecosystems contributing to the modelling of the landscape and forcing adaptative responses of the vegetation. The Neolithic man used fires as a tool for different purposes; burning forest land for farming, for hunting activities, straw burning and military campaigns, are some examples. However, the number of wild fires was kept at a relatively low level until the 1970s. After that, the number of forest fires and burned areas in southern Europe increased dramatically. Due to the economic effort and the building of infrastructures, the extension of the area affected shows a downward trend, however the number of fires is still increasing. It is probable that the climate warming trend and its aridification implications around the Mediterranean will increase the menace of wild fires. During 2005, the total area burned in five EU Members States (France, Greece, Italy Portugal and Spain) was 589,559 hectares. In the same year the number of fires that occurred was 73,325. Both figures are well above the average for the last 26 years (European Communities, 2006).

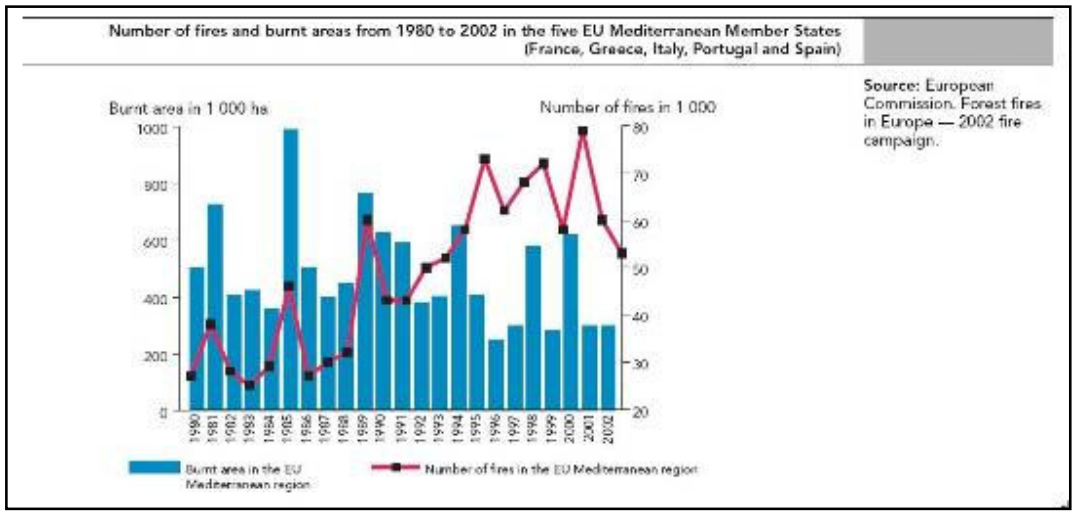


Fig 2 Number of fires and burnt areas in five EU Member States

Historical records of the Mediterranean show a relationship between drought and the number of fires. The tremendous increase of forest fires in Portugal during 2005 and 2005 coincides with a long period of severe drought. This could be a premonition of worrying perspectives related to the implications of the climate aridification trend and the likely increase of forest fires.

Water Scarcity

Water shortage affects about 2 billion people. It is thought that in 2003, 25,000 people died everyday from malnutrition and about 6,000 children (under 5 years of age) died from water-related diseases. In the developing countries, 80% of the diseases are water-related. The situation tends to worsen because of four basic reasons: unstoppable increase of the demand and use of water, sanitation conditions, climate change and aridification in drylands and finally the loss of the soil function to act as regulator of the hydrologic cycle.

The United Nations contemplates two situations. In the pessimistic scenario, it is believed that 7,000 million people, in 60 countries, will have a water shortage around 2050. The optimistic scenario is not flattering. It is believed that 2,000 million people, in 48 countries, will have a water shortage in the middle of 21st century.

Water in the Mediterranean context

The Mediterranean, is a basin historically and biophysically marked by its climatic characteristics and its water availability**.** Is a zone of climate transition between colder and humid climates in the north, and warmer climates in the south. Climate gives the Mediterranean a very unique personality with numerous cultural and economic connotations.

Water is a limited and precious resource in the Mediterranean. The main quality issues affecting the availability of water are: organic pollution, pathogens, salinization, nitrates, heavy metals, acidification, eutrophication and sediment load. The salinization of water is an important process in Mediterranean environments occurring due to climate conditions and human mismanagement.

Water salinization is normally linked to soil salinization. Soil salts are the base of soil fertility and also have important effects in different functional soil processes, for example, the dynamics of soil structure. However, the excess of salts or the unbalance in the ionic composition of soil solution could give rise to serious problems with soil function. The salts which accumulate include chlorides, sulphates, carbonates and bicarbonates of sodium, potassium, magnesium and calcium. Soil salinization and the related threat of sodification occur mainly in the Mediterranean drylands with preference in three major locations: natural saline coastal zones, inland endorreic saline watershed and zones affected by secondary salinization owing mainly to inadequate irrigation management. This last process is increasing and it is considered as an important process influencing the increase of desertification.

Droughts are a normal component of Mediterranean climate substantially affecting water availability. Closely related to it is the long historical practice of development of traditional soil and water conservation systems, and besides its regulation functions, constitute a rich cultural patrimony highly visible along the landscape. These traditional systems represent a wise and necessary ecological adaptation and the limitations and whims that one of the basic resources imposes as is the case with water. Terraces, stone walls, captures of water**,** rain tanks and channels are highly visible in numerous parts of the Mediterranean which constitutes a singular landscape feature. They represent the result of an impressive human effort of hard adaptation to natural conditions of the surroundings, the need to regulate the limited water resources as well as food production. Unfortunately, these traditional systems are in almost generalized present situation of abandonment that would require important performances of maintenance and recovery, if not thinking about a problematic agricultural or economic productivity, but at less as for the maintenance of their important functions of ecological, hydrological and landscaping regulation.

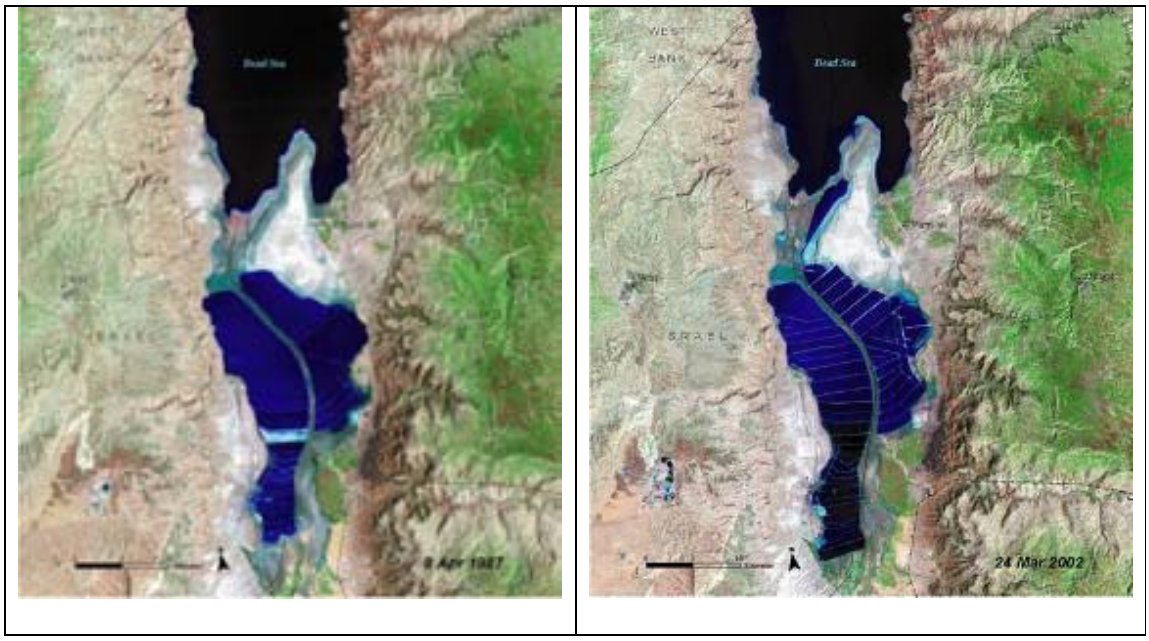


Fig 3 Two pictures of the Dead Sea from 1987 (left) and 2002 (right)

The traditional of conservation of soil and water, developed and applied systems in the past, represent the fight through time to adapt and to obtain productivity of problematic natural surroundings and fundamentally they derive from the shortage of precipitations and climatic variability. It surprises at the moment that that capacity of adaptation the past is had lost apparently and that the present droughts are contemplated like an unexpected and surprising phenomenon. In that sense we lack a long term planning of adaptation and prevention to the effects of the droughts which lately have become more frequent, partially due to climate change.

Conclusions

The desertification processes include important climate parameters like main mechanisms of triggering degradation processes**.** These parameters are related to the temperature, radiation, precipitation, erosivity of rain, evapotranspiration, climatic variability and droughts.

Important feedback mechanisms between the climate change trends and the processes of desertification exist, particularly the deterioration of the soil by desertification processes can release enormous amounts of CO2 and alter to the balance and flows of radiations, affecting to the climatic Earth regulation.

As a main conclusion, one can say that protecting and conserving the soil prevents desertification and, in addition, contributes to the prevention and the mitigation of climate change. Both subjects are perhaps, the two environmental priorities that at the moment require the greater effort of international agreement**.**

The economic cost of these threats must also be taken into account. The losses due to the erosion of the soil, in the set of the European Union are equivalent to 15 trillions Euros each year. Also in the EU, the costs derived from salinization processes are around 11 trillions Euros each year. In Spain, the Ministry of Environment has calculated that the direct damages and indirect costs of forest fires in the period between 1990 and 2005, are around 10 billion Euros.

There is a need to raise awareness on the reality of the shortage of water and its connotations as an essential resource. There is also a need to improve the efficiency of operation of the entire hydrological infrastructure.

An integrated vision of the cycle of the water is needed, e.g. applying tariffs and granting a price to the consumption of water would be probably the most effective measurement to promote effective water-saving policy, whenever these measures are designed from a perspective of social fairness**.** The precise application of desalination also offers important possibilities for the future, when we will most likely see new technological developments to improve efficiency and lower the economic cost and environmental impact.

Finally, a general plan for the prevention, adaptation and mitigation of the impacts of future droughts, with a national and an international scope, is a deficiency that needs to be tackled given the Mediterranean climatic characteristics and the long registry of droughts in the past.

References

Brauch, H.G. (2003) Security and Environmental linkages on the Mediterranean Space: Three Phases of Research on Human and Environmental Security. In: Brauch,H.G., Liotta,P.H., Marquina,A., Rogers,P.F. and El-Sayed Selim,M. (Eds.) Security and Environment in the Mediterranean. Springer

Braudel, F. (1972) The Mediterraneam and the Mediterraneam World in the age of Philip II, 2 volumes. Harper Row. New York

Buzan, B. (1998) Security: A new Framework for analysis, Boulder, London.

European Communities (2006) Forest Fires in Europe 2005. European Commission, Joint Research Centre

FAO (1996) The State of Food and Agriculture 1996. Food Security: Some Macroeconomic Dimensions. FAO. Rome

Guillaume, B. and Comeau, A (Eds.) ((2005) A Sustainable Future for the Mediterranean: The Blue Plan's Environment and Development Outlook" Earthscan. London. 464 p

Kirby, M.J. and Kosmas, C. (1999) Introduction. In: The Medalus Project: Mediterranean Desertification and Land Use. EUR 18882 EN, Office for Official Publications of the European Communities, Luxembourgh

Muller, H. (2002) Security Cooperation. In Carlsnaes, W., Risse,T. and Simmons, B.A (Eds.): Handbook of International Relations. Thousand Oaks, Londom

NATO (1999) *Environment & Security in an International Context*. Committee on the Challenges of Modern Society. Report 232, Brussels.

Rubio, J.L. and Recatala, L. (2006) The relevance and consequences of Mediterranean desertification including security aspects. En: Desertification in the Mediterranean Region: a Security Issue. Valencia NATO Workshop, Springer.

Rubio, J:L:, Garcia-Novo, F., Baldasano, J.M. and Martin Mateo, R. (2006) Estrategia Mediteranea de Desarrollo Sostenible. Generalitat Valenciana

Rubio, J.L. (2007) Mecanismos de retroalimentación entre desertification y cambio climatico. In: Cambio Climatico y sus Consecuencias. Presidencia de la Generalitat. Fundación Premios Rey Jaime I(ed). Generalitat Valenciana.

Rubio, J.L. (2007) Desertification y Cambio Climatico. Ambienta, 26-27, 70

Ullmann, R.H. (1982) Redefining Security. International Security, 8(1), 129-53

UNDP (1994) Human Development Report 1994. Oxford University Press. New York

Grounding security, securing the ground - Mr. Grégoire de Kalbermatten, Deputy Executive Secretary, UNCCD

INTRODUCTION

I would like to open these lines by paying tribute to the Government of Spain which brought the bottom line challenge of land and water scarcity on the agenda of the international security debate. The adoption of the Madrid Declaration on Environment and Security by the 56 ministers of the OSCE membership is an expression of this achievement. Spain has provided true guidance as a thought leader in it dual capacity as OSCE and UNCCD Chair. The responsiveness of the OSCE and NATO is an encouragement for those of us who have been dealing with these issues for some time now.

In presenting the 4th Global Environmental Outlook last October, the UNEP Executive Director sums up with a warning call:" *the human population is now so large that the amount of resources needed to sustain it exceeds what is available at current consumption patterns".*

It is fair enough to conclude that the planet is stressed. Here in Valencia we are looking at these stress factors at the scale of a particularly fascinating region, the Mediterranean. We trust this review can inspire similar analysis to foster cooperation in other regions.

ABOUT METHODOLOGY

When we are considering the continuum between economics, society, environment and security we need first to clarify the methodological challenge at hands. It relates to our tendency to favour or strengthen analysis over synthesis. The old model of Terence who projected European humanism on the basis that "nothing which relates to man is foreign to me" (*rien de ce qui est humain ne m' est étranger)* was echoed by the French philosopher Michel de Montaigne ("*chaque homme porte en lui l'entièreté de la condition humaine).* The classical model of the *honnête homme* was to be polyvalent, culturally connected and switched on. Such pretences haves been left well behind. Today, we go about knowing in a different manner.

I trust that, like myself, you had the opportunity to visit a doctor. As we can see in allopathic medicine, man has become the composite aggregate of diverse parts, each investigated by its respective set of eager hyper specialists. However man as a whole get lost in the picture. This is the way modernity claims to corner the field of knowledge.

It seems we handle the health of our societies in the same way. Our universities, as well as the structures of our administrations have followed a corresponding pattern where they promote sectoral expertise, thinking in separate silos and specialization. We tend to grasp an issue in seizing its constitutive parts, investigate them thoroughly, no doubts, but only too often we fail to identify the constitutive linkages or relationship between them that explain the evolution of the complex system.

Hence let me start by a first conclusion. Comprehending in a mutually reinforcing manner development and environmental security requires expanding our grasp through trans disciplinary research, cross-sectoral analysis and a broad systemic approach.

Notwithstanding the complexities of post modern societies, interdependencies and globalization, we need an enhanced capacity for synthetic thinking, for simplifying and reducing the perceived trade offs and equations to identify the strategic entry points for feasible and solution oriented policies. A given region is probably a correct scale for comprehending such synergies.

A CHANGING GEO STRATEGIC CONTEXT

It is interesting to note how the term "security" can translate in its contrary. For instance, in some countries, a visit from security forces, possibly in the middle of the night, does not really boost the personal sense of security of those who receive the visit.
The point being that security is best ensured when armed forces and their like do not need to intervene.

The North Atlantic Treaty Organization indeed has been perceived as a very successful military alliance chiefly because it did not come to fight its opponent, the troops of the Warsaw Pact. This follows the paradigm *si vis pacem para bellum* (if you want peace prepare for war) that illustrates the deterrent role of a military alliance.

Hence the concept of public security has evolved from a more stricto sensu notion of resisting aggression or maintaining public order to a more holistic notion of removing the conditions that can lead to a security threat. In that context many countries are redefining national security.

Let us illustrate this statement with an issue, which does not seem directly connected with a threat to security: it is the case of forced environmental migrants. A study by the Swiss Peace Foundation and the Federal Institute for Technology in Zurich has identified strong correlations between desertification, forced migrations and conflicts. More recently, prosperous coastal African countries such as the Ivory Coast or Kenya have found their domestic problems compounded by factors of instability in neighboring countries affected by desertification. As the instability in Darfur seems to move to Tchad such considerations may be revisited.

In Africa only, over 10 million people have been displaced in the past 20 years. According to the Report prepared by UNU entitled "Re-thinking Policies to Cope with Desertification" If no actions are taken, over the next 10 years roughly 50 million people, equivalent to the total number of people in South Africa or the Republic of Korea, are in danger of being displaced. Furthermore, if soil degradation in Africa continues at its current pace, the continent may be able to feed just 25% of its population by 2025.But the problem is far from being limited to Africa. Every year, between 700.000 and 900000 Mexicans leave their drylands homes to seek a living in the United States.

The Africa Review Report on drought and desertification submitted by the Economic Commission for Africa at the end of 2007 for the preparation of CSD-16, states that in the

past 20 years, nearly half of the total male population in Mali has migrated at least once to neighbouring African countries (96 percent) or to Europe (2.7 percent). In Burkina Faso, desertification can be identified, as the cause of 60 percent of the swelling of main urban centres. In Kenya one of the consequences of desertification is a constant flow of rural poor to Nairobi. The population of Nairobi has grown by 800 percent from 350,000 in 1963 to 2,818,000 in 2005. In such a context, political tensions may lead to lethal unrest and strife. Migration will exert stress on the poor and limited public infrastructure in urban areas and may exacerbate conflicts already witnessed in the region as result of scarcity of grazing land and water.

Migration will increase as the difficulties to feed a growing population intensify. The effects of desertification are therefore felt both in the countries of the South and in those of the North. The difference is that while for the first countries those effects are represented in soil degradation, loss of biodiversity and the impoverishment of the people, for the others desertification will be visible by the presence of immigrants, many of whom not being in a position to integrate socially in the country of destination.

In developing countries, desertification not only undermines the land's fertility, but it also, leads poor farmers to often adopt non-sustainable survival strategies that further deteriorate their resource base, this further reducing survival options.

It is therefore clear that migration is not a choice but often the only alternative. Alternatives do, however, exist. For example, the participants attending the IYDD conference in Mali on Youth and desertification requested developed countries in the Bamako Declaration to support the implementation of activities in areas affected by desertification as a way to prevent forced migration while providing income to young people. Investing in the protection and security of borders to prevent illegal immigration deals, imperfectly, with the symptoms; it does not address the causes.

The European Commission is also preparing a research project entitled "Environmental Change and Forced Migration Scenarios" (EACH-FOR) with the aim of producing detailed sub-region or country level forced migration scenarios, including environmentally induced migrants; presentation of causes leading to forced migration, with focus on environmental concerns; and an online running "environment degradation caused forced migration" simulation model for demonstration and policy purposes. To have a meaning in the country of origin of migrants, these efforts should be linked to measures taken under the UNCCD National Action Programmes.

We may better perceive why, under such trends, security planners must trace the causal factors of potential security threats at all levels. Beyond the expansion of the security concept to include economics, it becomes clear that the security establishment now include in its analysis natural resource, environmental and demographic issues. Declarations made in 2007 by the US Chief of Staff or investments by the Pentagon and the U.S. Security Agencies in research linked to climate change related issues soberly confirm the trend.

There are good reasons why military authorities in Iraq deal with issues such as access to arable land and water. There is a growing convergence of minds that, from a geo strategic

point of view, we need to focus on the sustainable management of natural resources and maintain the delivery of eco system services.

THE PARTNERING ROLE OF NATO AND OSCE

The North Atlantic Treaty Organization was molded by the political environment of the cold war; its attention focuses on the armies of Eastern Europe, the threat of an onslaught of mechanized armor divisions through the Fulda pass or the launching of ballistic missiles. Since the fall of the Berlin wall, NATO has identified other threats and a consequently evolving mission, focuses more, in a preventive sense, on the context of the civil society in regions outside the territory of the alliance.

I remember a vice admiral on NATO's planning command explaining the meaning of having troops in Afghanistan. NATO recognizes that the ongoing military operation corresponds to a short window of opportunities and that real stabilization of the Afghan society depends on socio economic development. In other words the ultimate success of the objective of the mission does not depend on the military capability of NATO. Yet the paradox is that the amounts invested in military and security operations are vaster then those invested in development.

This cannot be the long-term solution and this is why institutional coalition building is important. NATO adjusted to do just this and expanded its scope as an instrument for multilateral security cooperation. It facilitates political dialogue, capacity for networking, and applying technical expertise to problem solving. So perhaps we see here the emergence of a shift of paradigm for a preventive role of a military alliance: *si vis pacem, para pacem* (if you want peace, prepare peace.)

In the same vein, we found first hand that OSCE can operationalize its capability to enhance peace and security through well targeted initiatives in the economic, environmental and social fields. In this respect the launching of a drought management center in Central Asia by the countries of the region, OSCE and UNCCD supported by WMO is an illustration of a concrete initiative facilitated by multilateral cooperation. We trust that the forthcoming OSCE presidencies will encourage the organization's staying power on desertification issues. We must see these initiatives maturing to bring the expected accomplishments.

Both organizations continue to plan for the threats of tomorrow. But, under scenarios of climate change, the day after tomorrow is irrupting in our present and an increasingly restless public opinion is not sure the international community is prepared for it. Interventions in neighboring or more remote countries, as we just saw, inform NATO that its future focus, beyond the challenge that terrorism poses to the alliance's military capabilities, will include the implications of the scarcity of natural resources.

And, after all, this is only natural. History tells us that conflicts triggered, prolonged or expanded because of competition for access to natural resources have been the rule rather than the exception. This is true up to WW II: Stalingrad was meant to secure the road to Baku and its oil fields and the Japanese fleet was scrambling to secure the flow of necessary commodities to the mainland. Again, the term security is volatile.

In the postwar prosperity period, one may argue that, since the creation of the United Nations, the international community has increased its capacity to solve its dilemmas and challenges through peaceful means. However NATO and OSCE would probably plead for wise vigilance. Issues must be tackled before the man with the gun grabs them.

How do we bring land and soil in this equation? To be graphic, should we refer to the condition of the range when a certain Mongol nomad later known as Genghis Khan was pushed out of the ancestral grazing pastures? I am fond of referring to a study of the Federal Institute of Technology and of the Peace Institute in Zurich, which has tried to make the case.

As the UN Security Council has now deliberated on issues of climate change and security, let us not forget that, for billions of lower income people in the drylands, climate change - an abstract concept - translates in concrete and daily challenges: income, survival, combating desertification and drought, accessing water and food.

Water and food in the drylands is getting scarce. Allow me not to dwell further on the relationship between desertification and forced migrations and desertification and conflicts that we have already presented in the precedent meetings in Almeria and Valencia or at the recent OSCE Forum in Prague. You know the detention camps in Greece are overflowing and that thousands migrants perished in the perilous boat trip to the canaries islands. While it is not possible to give exact estimates of the total number of desertification induced migrants, tentative estimates indicate that at least 135 million people might be forced to leave their lands.

Who is ready for this?

LAND, SOIL AND DESERTIFCATION

Land degradation and the widespread loss of fertile topsoil in terms of quality and quantity is not a sudden event, but a gradual process, a creeping as well as a silent disaster. The effect of soil degradation is often not conspicuous, but nevertheless potentially very damaging, considering on one hand the soil's slow formation rate of 100 - 400 years/cm of topsoil and on the other side the irreplaceable value of soil in respect of maintaining ecosystem services and securing sustainable livelihood.

As I recalled at the opening of our COP 8 in Madrid last September, Desertification and drought are slow - but effective - killers that do not grab headlines like tsunamis or earthquakes. Perhaps because long terms measures and issues fail to catch the shorter-term attention of politicians and investors, decision makers have been unhurried to identify this pressing global threat.

When we are bringing in the equation climatic trends with its impact on increased aridity, water erosion, forest fires and drought, we are talking here about a major emerging factor of environmental scarcity with wide socio-economic implications in all regions of the world. The challenge is not limited to the drylands: salinization in the large irrigation systems of Asia, deforestation and land slides in Latin or Central America, loss of organic nutrients and pollution in the soils of developed countries, compaction of soil due to infrastructures everywhere are some aspects of an ongoing aggression on soil health.

The "land" challenge is intimately linked to water management issues. It lies in balancing the maintenance of the soil's biological, chemical, physical and productive properties, with recognition of the land's role in sustaining human well-being, and acknowledgment of the broader development links with political and economic processes. The scientific community has widely and long recognized that soil and, more broadly, "land" is a valuable, finite resource, and that its sustainable future needs to be assured. Soil is at the heart of the process of land degradation. A good soil health is a prerequisite for the provision of most of the ecosystem services in drylands.

The fertility of soil may face renewed challenges now if the waste of the biomass is removed and diverted towards the production of energy. We are told the World Bank estimates that filling a gas tank of 100 liters oil is the equivalent of over 200 kilos of wheat. What shall be the choice of our supposedly humanistic society: filling gas tanks or filling empty bellies? There must be a way to face this dilemma in a different manner.

In December 2006 the United Nations University released a study entitled. "Overcoming one of the greatest environmental challenges of our times: re-thinking policies to cope with desertification" In the introductory words of its Rector:

"Desertification is one of the most pressing global environment challenges of our time, threatening to reverse the gains of sustainable development that we have seen emerge in many parts of the world. It is a process that can inherently destabilize societies by deepening poverty and creating environmental refuges who can often add stress to areas that may not yet be degraded."

I have already referred in other forums to statistics touted by the Internal Union of Soil Scientists suggesting that, over the last 300 years the average soil loss was 200 million tons per year; and in the past 50 years this average has reached 760 million tons. 6 million hectares in annual loss to soil degradation is irreversible and an estimated 1860- M ha, or little more than half of the desertified area worldwide, requires rehabilitation. The cost of rehabilitation over a 20-year period has been calculated to be about US$213 billions. If not rehabilitated, the income foregone (over a 20-year period) could equal staggering US$564 billions.

Behind numbers we are concerned with people. Commenting on ecosystems and human well-being, the Desertification Synthesis of the Millenium Ecosystem Assessment, a major study in the field, encourages more integrated, forwards looking policies. It confirms that:

"Desertification is potentially the most threatening ecosystem change impacting livelihoods of the poor. Persistent reduction of ecosystem services as a result of desertification links land degradation to loss of human well-being."

It an era of prosperity it was easy to take for granted the ground on which we stand and the land that feeds us but we may continue to do so at our own peril:

- We are aware of the current scenarios of climate change/climate variability and their impact on worsening extreme weather events,

- We are aware that correlations between demographic growth, poverty and decreased availability of arable land threatens food security,
- We are aware that drought and desertification worsens water supply and sanitation conditions for over one billion people,
- We are aware that the consequent scenarios of mining non-renewable or slowly renewable natural resources create a generational equity gap of fateful consequences,
- And finally we are aware that consumption patterns and growth trends in large emerging economies put considerable further pressures on these final resources,

Being aware of these factors, the corollary should be recognition that a major environmental threat such as desertification brings considerable disruptive factors for the socio-economic security of nations and interstate relations. Being aware of these factors can we do something about it and use the instruments that were created to this effect?

The magnitude of these disruptions can reach a political breaking point and exposes the slow response of the international community in establishing a policy paradigm for environmental security.

Mismanagement of the environment contributes to reduced security in a direct and an indirect manner. From the feedback of UNCCD Parties, we quote, in the first instance, a local resurgence of the conflicts between pastoralists and sedentary communities for the access to water.

My colleague Boubacar Cissé will remind us that conflicts for water and arable land often appear to be ethnic -- and indeed may have evolved into such -- but they risk misinterpretation if we ignore their origins in resource disputes and poverty. Although these conflicts may be described at local level, notably in an African context, they also exist on other scales. In a more indirect manner there is a growing competition for water between various sectors of the economy, between the city and the countryside, between the few rich and the many poor.

Clearly, valuing to its correct price the natural capital shall contribute to keep poverty in check, provide support to economic growth and confirm the role of global public goods in the sustenance of our societies. We need a Stern report on land and soil that will expose the cost of inaction and show the economic rational for investments in these fields.

THE PRESENT UNCCD CONTEXT AND SECURITY ISSUES

In short, land is a multidisciplinary issue of global significance. Most of human activities affecting income and environment take place on land. Sustainable land management is the 'foundation' of sustainable development, the main source of livelihoods, food and natural resources for peoples through the world. Given the importance of natural capital in the wealth of low-income countries, land even represent the most important tangible capital for most of the rural communities, representing more than 75% of the natural capital (WB, 2005). The pressure and footprint of human activities on land is already highly unsustainable, and considering current development patterns, it is not likely to become more acceptable unless serious and drastic measures are taken.

The challenge is not limited to the drylands but affects all types of ecosystems: salinization in the large irrigation systems of Asia, deforestation and land slides in Latin or Central America, loss of organic nutrients and pollution in the soils of developed countries, compaction of soil due to infrastructures, erosion in mountainous areas are some aspects of an ongoing aggression on land productivity and soil health. As FAO reported in December 2007 that the Food Price Index had risen by 40%, the international community is slowly, too slowly, remembering that the availability of basic agro commodities at an affordable price are a condition for political stability. Ignoring the Right to Food of lower income groups ends up in a price to be paid by the political elites, a lesson learnt also at the time of the French Revolution. There is no food without arable land and availability of fertile soil at the required scale is not secured today without combating desertification land degradation and drought.

The 'land challenge' is clearly linked to water management issues. It lies in balancing the maintenance of the soil's biological, chemical, physical and productive properties, with recognition of the land's role in sustaining human well-being, and acknowledgment of the broader development links with political and economic processes. The scientific community has widely and long recognized that soil and, more broadly, 'land' is a valuable, finite resource, and a prerequisite for the provision of most of the ecosystem services in drylands and the longer-term survival of many communities.

'Land' is thus the focus of a high number of activities undertaken by the international community to address problems of desertification, land degradation, loss of biodiversity, impact of climate change and variability and their subsequent effects on livelihoods and development. Most prominently, the United Nations Convention to Combat Desertification (UNCCD), with its 192 Parties, is the only universal treaty addressing the problems of desertification and land degradation, and effects on loss of fertility and biodiversity. It consequently addresses sustainable livelihood issues, for millions of people in the world.

For instance, as recognized recently by the scientific International Forum on Soils, Society and Global Change held in Selfoos, Iceland, in August 2007, the stewardship of soil results in:

a) Conservation of the soil resource, and of the ecosystem services that depend upon it;
b) Improved food security and fibre productivity for human well-being and development;
c) Increased water storage capacity and flood prevention, and water supply;
d) Increased capture and retention of carbon and other greenhouse gases to mitigate global climate change.

You are of course well aware that, the UNCCD, although the only universal normative instrument dealing with land, soil and related issues, did not receive the same attention than its sister Conventions on biodiversity and climate change. However a new trend is emerging, driven by the realization that scarcity of natural resources is potentially endangering human society on many continents. In the aftermath of COP 8 in Madrid last September and of its adoption of a forward looking 10 years UNCCD Strategy, the UNCCD visibly benefits from a more favorable environment.

The "10-year Strategic Plan and Framework to Enhance the Implementation of the Convention, also called "The Strategy", puts a renewed emphasis on the problems related to land degradation and effectively portrays 'land' as the principal subject of sustainable development, as it links the halting of land degradation and sustainable land management to the amelioration of living conditions of populations and ecosystems and the provision of global benefits. The new strategy addresses the points above, by enlarging the scope of CCD action and promoting a proactive approach to awareness raising and advocacy and the strengthening of the scientific capacity on land issues.

- This ten-year strategic plan and framework contains four strategic objectives that address the livelihood of people, the ecosystems, the overall global added value generated by the UNCCD, and the tools, namely the resource base, for the implementation of the Convention. These strategic objectives would guide the actions of all UNCCD stakeholders and partners during the period of 2008-2018.

- The strategy also contains five operational objectives that would guide the actions of all UNCCD stakeholders and partners in the short and medium term (3-5 years) with a view to supporting the attainment of the strategic objectives. These objectives focus on

    1. advocacy, awareness raising and education
    2. policy framework
    3. science, technology and knowledge
    4. capacity building and
    5. financing and technology transfer

The Strategy identifies a number of objectives and expected impacts which are of interest to many processes as it brings down to earth the impact of global challenges on the everyday life on the billion of poor that still depend on natural resources for their survival.

- Improving and diversifying the livelihood base and benefits from income generated from sustainable land management;
- Reducing populations' socio-economic and environmental vulnerability to climate change, climate variability and drought;
- Enhancing land productivity and other ecosystem goods and services in affected areas in a sustainable manner;
- Reducing the vulnerability of affected ecosystems to climate change, climate variability and drought;
- Contributing to the conservation and sustainable use of biodiversity and the mitigation of climate change through sustainable land management and combating desertification.

As stated in its mission, the Strategy provides a global framework to "support the development and implementation of national and regional policies, programmes and measures to prevent, control and reverse desertification/land degradation and mitigate the effects of drought through scientific and technological excellence, raising public awareness, standard setting, advocacy and resource mobilization, thereby contributing to poverty reduction".

In other words, the UNCCD Strategy, puts a renewed emphasis on the problems related to land degradation, desertification and drought in a global context of climate change. As a matter of fact, it proposes a logical framework to better link sustainable development to the maintenance of eco system services and the reduction of poverty so as to provide benefits at all levels, from the global to the local. In short, the strategy focuses on the potential for sustainable land management to build up synergies that improve environmental governance.

The Strategy has been well received by all constituencies and the exemplary leadership of Minister Narbonna, the President of the COP, in achieving the positive outcome of the Conference must be saluted. You will note the Strategy calls the secretariat to develop a comprehensive communication strategy.

As we move on to discharge our responsibilities in awareness raising, we remember that the next review cycle of the 16th and 17th sessions of the United Nations Commission on Sustainable Development (CSD) will focus on the issues of Africa, Agriculture, Rural Development, Land Degradation, Desertification and Drought.

Indeed, the environmental dimension of conflicts and migration points at the comparative advantage of the United Nations Convention to Combat Desertification, as a process and unique conceptual intervention platform to address the challenges of environmental stress, conflict prevention and the security-environment interlinkages.

We also make the point that UNCCD as an existing multilateral normative framework can establish in a credible manner the connectivity of issues and call for more integrated cooperation (international/multilateral; national/ stakeholders involvement). This implies both top-down and bottom-up efforts.

Thus we remain interested in developing more preventive and comprehensive security approaches that include prevention of socio-economic and environmental conditions likely to threaten security and increase the danger of strife and conflicts.

> Acting in the name of international law - the might of the law - is always preferable to acting in the name of more limited national interests - might is right. Everyone has a stake in the former, and so couching action in terms of a consensus normative framework universalizes a country's interests, comforts potential allies and provides the legitimacy for strategic alliances.

We trust that you share our understanding: the UNCCD as an "underutilized" SLM (sustainable land management) instrument of international cooperation and solidarity does, in the light of its new Strategy, carry a great potential to become one significant element in the response of the international community to emerging challenges exacerbated by climate change.

As the international community increasingly focuses on the necessity to adapt to climate change, the UN system is recognizing the need for strategic partnerships when it comes to crosscutting sustainable development issues. In the case of the 'land challenge', several non

UN organizations could join forces with CCD to further action at the international and national levels and increase awareness for the all-important issue of rural development.

This could present an opportunity for us to present a study as a contribution of the UNCCD and interested sponsors to better mastering the basis for sustainable development and security in the affected areas.

FOCUS ON CONNECTIONS

1. The planned study should offer a state of the art synthesis with a convincing and credible level of conceptual innovation on **"Grounding security" or "securing of the ground"** by:

    - Securitizing both natural and socio-political problems related to desertification (land and water scarcity) in the global drylands while reflecting the ongoing global policy and academic discussion on a widened and deepened security concept;

    - Securitizing the impacts of desertification and land degradation on natural hazards (drought, dust storms, forest fires, downstream flooding, watershed mudslides,)

    - Securitizing the societal outcomes (internal displacement, distress and forced migration, famine, manifold crises and violent internal and international conflicts) reinforcing each other as complex emergencies;

    We believe that combating desertification is a strategic entry point to address vulnerability issues, secure conditions for ecosystem maintenance, achieve the Millennium Development Goals, reduce the impairment of global carbon sequestration capacity and reduce also risk factors that could lead to forced migrations and social instability.

2. The expected focus on connections to establish would include:

    - Causes: desertification in combination with water scarcity, degradation and stress, population growth, food and health security;

    - Spatial application: global, with a specific focus on Africa, Latin America, the Middle East and North Africa (MENA), Europe, Central Asia and China;

    - Impacts of climate change and desertification: natural hazards and disasters (catastrophes);

    - Relationship between desertification/drought and the loss of a sustainable livelihood due to hunger, forced and distress migrations, crises and conflicts;

- Risks and costs of non-action: impacts of business as usual climate change scenarios;

- Long-term trends or implications related to natural resource scarcity in rural areas in the drylands under scenarios of climate change with perspectives up to 2020, 2050 and 2100;

- Outlining global, regional and national policy strategies and responses:

  - Bringing sustainable income to rural areas/drylands by enhancing sustainable pastoralism and agriculture (soil and water management, ecotourism) and e.g. by environmental services and renewable energy,
  - Crises and conflict management and resolution mechanisms
  - Developing a path for sustainable solutions, including in the UNCCD context:
  - Combining traditional indigenous and modern scientific and technological knowledge in:

    - water harvesting and management,
    - sewage, recycling and reuse of treated water,
    - composting, terracing, association and rotation of crops, sustainable management of fallows,
    - grassland and reforestation with nitrogen fixation from the air to the soil,
    - combating forest fires,
    - exploiting the unused economic potential of renewable energy (wind, solar thermal and photovoltaic, biomass and waste, geothermal energy) improving energy efficiency and

- Technology sharing, joint development (adapted applications of low-cost and locally produced tools),

- Awareness raising and capacity building (training of local experts and people).

THE MEDITERRANEAN REGION

At once diverse and one, the Mediterranean is no longer the *Mare Nostrum* of one of its neighbouring tribes. The region has a rich experience of conflicts and convergences, of cohabitation between pastoralist societies and sedentary structures, Islam and Christianity, diverging views or accommodating differences. In half a century its population will almost double from 285 million inhabitants in 1970 to 544 million around 2020. But if population stabilizes on the Northern shores, it explodes on the Southern one with a population of 116 million in 1970 jumping to 331 million in 2020.

At the same time water scarcity and drought in the region is on the rise as documented by the EC communication on the subject of the Council and European Parliament.

Some patterns may look similar in the 21 countries on all its shores, such as the littoralisation of the economy and tourism and the resulting demands for water, which compete with agriculture. Water stress issues are widespread. But differences are also apparent.

The Northern shore is well developed, the Eastern Northern shores, more mountainous is still developing. The Western and Southern shores are on the margins of the immense drylands areas that run from the Atlantic shores to border of China. There is no doubt that aridity is one of the faces of the Mediterranean region. Henceforth, focusing on the governance of natural resources is well tailored to address strategically the challenge of environmental scarcity in this region.

Research has pointed to the sensitivity of the region' s ecosystems to the overuse of drylands resources in the western and southern regions of the Mediterranean contrasted with the very high population growth rate. Population do not exist or grow in a cultural vacuum and this is a reality that we tend to ignore although it is a factor that exerts an overwhelming influence on the way people respond to constraints and stress.

A REFERENCE TO CULTURAL PERCEPTIONS IN THE MEDITERRANEAN CONTEXT

There are great merits of course in convening a meeting where ecologists and military strategists identify common concerns. May we stretch their thinking just a bit further and touch also upon cultural factors? They are all pervading and sometimes frame the hidden assumptions and possible webs of misunderstandings that affect a necessary dialogue.

Behaviour is strongly influenced by cultural conditionings. Cultural factors must be seen in a broad sense and include also the religious dimension even if we might all agree that faith is considered by many as an intensely private matter that ought not be discussed.

However history has shown countless time that religion mixes with politics. More recently, the occurrence of terrorism inspired by religious radicalization is a phenomenon that has been now investigated from various fronts. While religion does not appear on the radar of security planners, terrorism does.

Again, terrorism as such is not a new phenomenon. The 19th century knew its lot of anarchists and one could argue that the shooting at the Austrian Archduke in Sarajevo that triggered World War I had all the markings of a terrorist assault. It also points out to the fact that those seen by some as terrorists are seen by others as freedom fighters. We shall not touch this debate here. The aggression on the heir of the Austrian empire also tells that the security implications of a terrorist attack can get out of hands.

Researchers look at the resurgence of violent behaviour to express religious convictions or political aims in the context of socio economic terms. In this vein the export of poverty from the countryside to the cities, with desertification acting as a push factor, is seen sometimes as creating a "*lumpen Proletariat*" of environmental migrants that are losing their communal surroundings and role in society.

The loss of psychosocial identity can contribute to the need for reconstructing an identity around values perceived as stronger. Merchants of simplified dogmas and fake prophets of radicalized religions can capitalize on this need.
Indeed these processes have appeared at diverse period of history and in all religions. But greater understanding between diverse cultural groups denies them a fertile ground.

While such considerations may have an indirect but real bearing on changing security trends, they are mentioned here just to sketch a simplified description of the cultural landscape in which we operate. In the context of the Mediterranean it may be generally helpful to improve cross-cultural dialogue while clearing two levels of misunderstandings one at the religious level, one at the moral level.

The first clarification thus deals with the religious dimension and the so quote clash of civilization or concept of "the fault lines of history", an assumption that old conflicts across the Mediterranean, between Christianity and Islam, will reappear. However, recognising that life in Europe today is more influenced by secularism than traditional beliefs, should we not assume that the driving cultural relationships today are not between the faiths of the Mediterranean shores but between these respective faiths and the impact of secularism? The projection of a revival of ancient armed conflicts is not well founded.

The second clarification deals with morality. The hypothesis submitted here is that no shores have the monopoly of morality. It is not infrequent that cultural community tend to think they have some sort of moral hedge over the others, focussing on their neighbours alleged troubles. For instance, Northern countries may focus on governance or corruption issues of Southern countries while these tend to see the moral hedge of their societies on another front. At times, they look at social statistics in advanced developed societies on the Northern shores as an expression of moral flaws in terms of lifestyle or erosion of family values. All Mediterranean societies, in fact, are in a process of coming to terms with some or other implications of secularism in a post modern and global context.

Reciprocal misperceptions will probably stay with us for some time. To overcome them in the region, it is advisable to seize issues that bring shared ethical values and common interest.

In the Mediterranean region for instance, participatory cooperation between the EU political space and its neighbours could be articulated around the maintenance of eco system services, agriculture and rural development and would propose a test case for generating mutual respect and balancing complementary economic interests in the context of globalization.

Promoting a territorial approach for local development, also under the new UNCCD Strategy, shall give a renewed impulse to rural development and reaffirm the identity of a community in relationship to its territory and the defense of its ethnic and cultural heritage.

ABOUT POSSIBLE RESPONSES AND THE UNCCD

What can be done in the context of the Convention?

1. UNCCD welcomes collaboration on request between UNCCD focal points in affected countries, UNEP Plan Bleu, OSCD and NATO to identify hot spots in the nexus environment/security and security/environment.

2. The comprehensive information strategy to be prepared by the secretariat can include initiatives contributing to identify solution-oriented responses to the dilemmas of environmental security.

3. Amongst tested approaches, the decentralized governance of natural resources will encourage the wise blend of new and traditional technologies and best land use practices.

4. Thus lessons learnt can be advocated and participatory eco development promoted though an agro environmental focus to diversify economic activities, reduce poverty, and manage water and biomass resources in a sustainable manner.

5. Cooperation between the UNCCD Regional Implementation Annexes can offer a platform to further exchange information, probe desertification and security issues and advocate policies to support territorial collectivities.

6. Reducing uncertainties and reducing knowledge gaps on desertification through information gathering, long term remote sensing and sub-national biophysical and socio economic data may clarify the relationships among land, climate change, biodiversity ecosystem services and human well being and public security. Enhanced involvement of the scientific community in the context of the Committee on Science and Technology of the UNCCD (CST) should help.

7. Therefore, better monitoring and regular reporting on the state of land as is done for climate by the IPCC is desirable. A call for an Intergovernmental Panel on Land and Soil has been made in the international scientific community and should be encouraged in the context of the CST.

8. Finally, some of our parties advocate as a pertinent measure the training of the armed forces. Indeed the army has a huge comparative advantage in terms of logistical capability and could be usefully engaged for disaster relief, which is already often the case, or less frequently, for targeted support to critical environmental action such as a tree planting campaign or the rehabilitation of waster harvesting infrastructures.

CONCLUSION

The efforts of the international community to identify a practical public defence concept may end in entropy rather than synergy if we fail to establish driving connections in the area of environmental governance and security.

The UNCCD process under its new 10 years strategy can exploit its normative comparative advantage and, while joining hands with partner institutions and programmes, bring forward a better integrated response from the international community to the oncoming identified challenges for sustainable land management.

NATO and OSCE members can apply the analytical power of these organizations to decipher the oncoming geo strategic risks the membership is facing. This shall raise the policy visibility of critical issues handled by the UNCCD.

The Convention process can definitely help in promoting best practices for SLM including participatory eco development at a territorial or sub regional scale in the context of the National Action Programmes.

When eco development and security issues shall be perceived and addressed in their interdependency, involving the local population that are affected, the term security is more likely to have the same reassuring meaning for everybody on all shores of the Mediterranean.

Working Groups Reports

WG I - Security Implications of Unsustainable Water Management and Land Use

Facilitators: Prof. Uriel Safriel and Prof. Winfried E.H. Blum
Rapporteur: Vicente Andreu

Participants addressed the severity of water shortage and land degradation in their respective countries, commended themselves for the actions taken by their countries to respond to water shortage and land degradation problems and (in the case of developing countries) made a plea for support, with implications of support that is financial. The need to better understand the difference between "environmental degradation" and loss of "environmental security" was highlighted.

The Conceptual Framework of the Millennium Ecosystem Assessment was presented, in which soil conservation, land productivity and water resource provision and regulation are viewed as ecosystem services, which provide for "Human Well-Being", major component of which is "security", meaning personal safety, secure resource access and security from disasters. Desertification and land degradation can therefore be viewed as failure of ecosystems to provide the above services. This failure is driven by direct drivers (biophysical) such as soil erosion and salinization, water pollution, etc. which in turn are driven by indirect drivers (social, economic, demographic, political, governance, etc). The latter interact with human well-being. Namely – economic and social factors affect human well-being, including security, but human well-being also affect social structure, policy and governance, which in their turn result in over-use of resources (direct drivers), causing desertification and land degradation.

Recommendations

The OSCE and NATO could commission a team of experts to provide a robust, though user-friendly, definition of environmental security. This needs to be supported by a description of actual cases, in which desertification has been shown unequivocally as a driver of security loss.

The priority for investments by NATO and OSCE in measures that address desertification risks should be directed to the Southern Mediterranean developing countries, most of which are Mediterranean Dialogue (NATO) and/or Mediterranean Partners for Co-operation (OSCE) countries.

NATO and OSCE could commission a small team of experts charged with exploring and harmonizing different approaches, including the "Conceptual Framework of the Millennium Ecosystem Assessment", which should come up with a robust yet friendly definition of the relevant terms.

The OSCE and NATO should carry out an independent survey of the current state and the current trends, as a basis for developing scenarios for the drylands of the Southern Mediterranean countries in the coming 25 years. The assessment of the current state is of immediate priority, while constructing scenarios is a task for the medium-range time frame and deriving conclusions as to the effective interventions of NATO and OSCE – for the long term time-frame. Participants concluded that it was not advisable for NATO and OSCE to intervene right away but rather that they should invest first in a situation assessment.

The OSCE and NATO could promote studies in Southern Mediterranean countries that would elucidate the role of biodiversity to avert desertification and water scarcity, studies whose results would serve as a basis for planning measures for conservation of the biodiversity components relevant to reducing desertification and water scarcity risks.

The OSCE and NATO could assess the state and trends of population growth rates in the rural sectors of the Mediterranean countries. This assessment would enable the OSCE and NATO to prescribe action for averting security risk deriving from the expected desertification, driven by population growth.

WG II - Loss of Livelihoods and increased Migration

Facilitators: Dr. Tamer Afifi, Dr. David Mouat and Dr. José L. Rubio
Rapporteur: Philip Reuchlin

After initial presentations on a Commission funded research project on global environmental migration[2] in 24 countries as well as some introduction into scenario development and alternative futures, participants discussed some of the issues related to migration.

Migration is often not perceived to be caused by environmental reasons, not even by the migrants themselves. Indeed academically, the causal linkage is not fully established yet and should not be overstated. What is needed in this respect is more research on very specific case studies not only in the Mediterranean region but also in sub Saharan Africa, since the Southern Mediterranean countries are increasingly becoming transit countries.

Outward migration is in fact a security issue, in the sense that it leads to a loss of local knowledge of the land and this loss is, most of the time, irreversible. It puts pressures on legal migration channels. Furthermore, the trafficking organisations that assist migrants in illegally traversing the Atlantic or the Mediterranean are well organized criminal groups. However, it should also be noted that migration can have a very positive impact on destination and origin countries. This issue was the subject of a conference to be held in Rabat on 12-13 December 2007.

Recommendations

The OSCE and NATO should undertake pilot projects to increase and improve the livelihoods of local people in order to reduce environmental migratory pressure.

[2] See ANNEX I

The OSCE and NATO could organize a workshop on technology transfer for better water management in the Mediterranean Region.

The OSCE and NATO should promote dialogue on environmental migration as it will most probably grow in importance over the coming years.

The ENVSEC initiative, as a partnership between various agencies specialized each in different areas, could be a vehicle for undertaking more detailed environment and security assessments but it would be up to the Mediterranean countries to express the demand for such an assessment.

WG III – Linkages between Combating Land Degradation, Desertification and Conflict Prevention

Facilitators: Mr Boubacar Cisse and Dr. Abdel Gilil
Rapporteur: Gabriel Leonte

After a general introduction of the UNCCD tasks of proposing measures to countries and regions with the aim to curbing natural resources degradation, promoting sustainable development and therefore avoid conflicts and movements of population, participants agreed that conflicts are mainly triggered by the bad management of natural resources, not necessarily by the fact that resources are limited. The good governance of natural resources is a key factor for conflict prevention, combating poverty, insecurity and migratory pressures.

Participants addressed the main question of how coulf the partnership between the UNCCD, NATO and the OSCE be enhanced, also having in view the respective mandates of these organizations and what form of partnership should be established. They agreed that the UNCCD, as the expert organization, provides the general framework and that, at national and sub-regional levels, its action programme could be the basis for cooperation, whereas NATO and the OSCE could raise awareness among their membership regarding the links between environment and security and might also raise funds for local projects.

There was an agreement that scientific cooperation was important, as well as the development of case studies and pilot projects but the effectiveness of existing mechanisms should be assessed, so that it could be improved.

A number of countries presented some experiences regarding the management of natural resources, such as:

- Green belts to stop desertification, generate economic activities and stabilize population (Algeria)
- Combating desertification, good governance, irrigation, land amelioration and national parks (Morocco)
- Users associations, in particular in the area of water management and involvement of the civil society (Tunisia)
- Reforestation (Spain)

Such good experiences could be shared among the countries in the region. International organizations could facilitate this.

Recommendations

The OSCE and NATO could commission a survey by an interdisciplinary group of experts to explain the links between environmental degradation and security and the actions needed.

Upon demand from countries in the region, an Environmental and Security Assessment in the Mediterranean Region could be launched. It will draw on the Environment and Security Initiative (ENVSEC) experiences in other region and would provide a bridge between scientific expertise and political action. The assessments should focus on possible future conflicts regarding natural resources. Possible scenarios should be developed and, based on them, prioritization should be decided. Mechanisms to avoid future conflicts should be established.

The OSCE, NATO and the UNEP Blue Plan could contribute to the UNCCD inter-regional cooperation mechanism[3].

All participants were invited to report on the results of the workshop to their relevant authorities as follow-up action is needed at various levels and any future engagement should be demand driven.

WG IV – Managing Water Scarcity

Facilitators: Prof. Mohamed Badraoui and Mr. Javier Ferrer
Rapporteur: Philip Reuchlin

After a presentation of the institutional setting of the European Water Framework Directive, in particular national and basin management of rivers, and remarks on the definition of water scarcity[4], participants agreed that integrated water resources management was the best way to overcome water scarcity.

Participants recognized that there was a strong linkage between water and energy economics and that industry and that agriculture and urbanization were competing for water usage so that there was a need for decision making in order to allocate water quantity and to evaluate cost/benefits.

It was stated that water data were a national security issue (especially in the case of scarcity); therefore sharing these data would be difficult, but nevertheless beneficial for all stakeholders, including civil society and local communities.

[3] Within the UNCCD context and its 10 years strategic plan, given that Mediterranean countries are part of different "Annexes", an inter-regional cooperation mechanism should be established.
[4] See ANNEX I

There is a need to use jointly conventional measures (like mobilization in reservoirs/dams[5]) and non conventional measures (like desalination or re-use of treated water) and to increase water usage efficiency and conservation.

There are many networks and initiatives in the area of water management in the Mediterranean region (Mediterranean Network of Basin Organisations, Mediterranean Strategy for Sustainable Development, Medias France, Arab Council of Water, etc..) and there is insufficient coordination among them.

The level of integration of water resources management (watershed, water basins, country, and region) to take into consideration should be specified.

It was stated also that all Mediterranean countries were exporters of virtual water (exporting water as through their agricultural products), except in case of France.

Recommendations:

The OSCE and NATO could engage in a mechanism of protection and prevention of destruction of transboundary aquifers. A workshop on this issue was recommended.

The OSCE could assist in promoting public participation in environmental issues and decision making in water issues (Aarhus convention).

The OSCE and NATO could foster dialogue on the possible creation of a MENA network of water experts.

The OSCE and NATO should further explore their involvement in:

- Preparing a compilation of best practices of integrated water resources management and water conservation around the Mediterranean basin,
- Stimulating innovative ways to provide water and manage water resources, including through technological transfer and ideas to increase efficiency,
- Improve co-ordination among the many different actors who are working on this issue,
- Establish a regional monitoring system, based on data exchange and research[6].

[5] In some countries there is lack of storage capacity.
[6] Being discussed in Slovenia at a meeting of general directors of water.

Closing Plenary - The role of the OSCE and NATO, and other competent organizations in raising awareness about environment and security aspects in the Mediterranean Region.

Water scarcity, land degradation and desertification are factors that have direct negative consequences on the general status of the ecosystem affected by these phenomena and on the people who live in the same ecosystem. The decrease of available resources, the competition to get access to them, social and political instability and migration are also consequences of a degraded environment and are directly related to the security of populations.

This was the rationale on the basis of the which NATO and theOSCE decided to organise the workshop held in Valencia on 10 and 11 December 2007. The challenge was to gather scientists, experts and policy makers from different countries to analyse the environmental conditions of the Mediterranean region; to discuss the security aspects of water management and land use; to assess the loss of livelihoods and to identify means of combating land degradation and to prevent possible conflicts.

The organisers of the workshop never presumed to exhaustively answer the issues related to the topics discussed at the meeting. However, NATO and the OSCE played an important positive role by providing a forum of discussion for representatives of different institutions. By doing so, a first important result was achieved: to increase the awareness of issues such as land degradation and desertification in the Mediterranean region as a potential risk to social and political stability.

The presentations at the general sessions were of high quality and detailed; the discussions in the working groups were lively and practically oriented. Many proposals were put forward for further consideration by the experts and the policy makers such as:

- the analysis of case studies in the Mediterranean region
- the identification of best practices
- the launch of pilot projects for land remediation
- the establishment of national information centres on land degradation and desertification
- an environment security assessment for the Mediterranean Basin.

The debate and the activities on the above-mentioned topics should involve other international organisations besides the OSCE and NATO and it is urgent to increase the dialogue between the concerned countries in the Mediterranean Basin.

The existence of national plans to counter environmental degradation and desertification was noted and the importance was stressed of an increased co-operation across political boundaries. Here there is again a potential role for international organisations, which could serve as platforms for trans-national collaboration.

Some important issues were only approached in a preliminary way and need further discussion such as:

- Evaluating to what extent improper water and land management affects populations in a way that reduces their security and also may lead to conflicts within the communities concerned (these conflicts may concern a large segment of the population and may even cross political boundaries, thus affecting regional political stability).
- Better defining the concept of "Environment Security". As a matter of fact, scientists and policy makers do not always have the same perception of this concept. Consequently future meetings and analysis on this subject should be more related to specific cases in which land degradation and desertification have shown to be unequivocally as drivers of security loss.

The recommendations and the concepts elaborated during the two-day workshop will be brought to the attention of the National Representatives in NATO and in the OSCE and will also be a contribution to an expanded security concept, which should be tackled from different angles, both at the national and at the international level, for elaborating integrated strategies.

The OSCE and NATO, together with the UNCCD, played a pioneering role in elaborating these recommendations and these concepts. The most important next step to implement them would be the launching in the Mediterranean Region of a cooperative partnership such as the ENVSEC initiative (in which UNDP, UNEP, UNECE, REC, OSCE and NATO are working together) aimed at addressing environmental risks to security and at fostering stability through environmental cooperation.

ANNEX I

Egyptian Water and Soil: A Cause for Migration and Security Threats? - Tamer Afifi, United Nations University Institute for Environment and Human Security, UNU-EHS, Bonn

1. Introduction

The total area of the Arab Republic of Egypt is about one million km², most of which is under arid and hyper-arid climatic conditions, and of which a small portion representing only 3 percent is agriculturally productive. The six main agro-ecological zones in Egypt are the Nile Valley including the fertile alluvial land of Middle and Upper Egypt, where the main source of irrigation water is the Nile River. Agriculture production of Egypt is mainly concentrated in this zone in addition to the Delta.

1. The Nile Delta region, where the main source of irrigation water is the Nile River as well. Together with the Nile Valley, the agriculture production in this zone consists of about 6.6 million acres. Most of the soil in both areas is recent Nile alluvium.
2. The reclaimed desert areas in the fringes of the Nile Valley, where the only source of irrigation is the ground water.
3. North Coastal zone: including the coastal area starting from North-Western coast moving eastwards to North coastal area of Sinai Peninsula, where there are no reliable figures are available neither on ground water quantity and usage.
4. The Inland Sinai and the Eastern Desert, where the main source for irrigation is the ground water, and
5. The Western Desert including oases and southern remote areas, where the groundwater is mainly extracted from the Nubian Sandstone and carbonate aquifers.

Although the Nile River streams through the Egyptian land, water is regarded as a scarce natural resource, due to the rapidly growing population in Egypt, the latter's limited quota of the Nile Water and the wide desert lands where the main drinking and irrigation water resource is the underground water. Furthermore, the Egyptian land suffers from different variations of degradation along the country, depending on the region and the inhabitants.

This paper addresses the question whether water shortage and land degradation can have an impact on migration within and from Egypt and whether this could have implications on security, especially that Egypt is part of the Mediterranean Region that is one of the most vulnerable areas in terms of environment and security linkages.

The paper starts with a literature review on environmental migration, moving on to demonstrating some details on general migration in Egypt. Then the paper sheds a light on water shortage and land degradation, moving on to the outcomes of the field work run in Egypt, and attempting to link the two aforesaid environmental problems to migration patterns and hence eventual security problems. The paper concludes that environmental migration exists in Egypt, but that it is not a sufficient factor for taking the decision of migration, since usually there are other 'amplifying' social and economic factors that influence such a decision or at least seem for the migrants to be the real reasons for their migration.

2. What others wrote about 'environmental migration'

In this section, the paper attempts to shed a light on the literature that tackled the topic 'environmental migration' and how the issue is looked at from different points of view, according to the different authors and/or organizations.

In a report released by the UN Environment Program (UNEP), *El-Hinnawi* (1985) defined the environmental migrants as "those people who have been forced to leave their traditional habitat, temporarily or permanently, because of a marked environmental disruption….that jeopardized their existence and/or seriously affected the quality of their life".

Numbers and figures about environmental migrants worldwide differ depending on the definitions and hypotheses. UNEP former head, Klaus Töpfer, talks of 22-24 million environmental migrants (Biermann, 2001), whereas *Myers* (2005) reports 'at least' 25 millions in 1995 (latest date for a comprehensive assessment), especially in the African Southern Sahara, China, Central America and South Asia. Meyers even expects the number to reach around 50 millions by the year 2010. Myers compares these 25 million environmental refugees to 27 million 'traditional' refugees (people fleeing political oppression, religious persecution and ethnic troubles).

On the other hand, many other international documents, such as the *Declaration on Environment and Development* of the 1992 Earth Summit in Rio de Janeiro, do not mention a single word about 'Environmental migrants'. Agenda 21 of the Summit refers to the word only one time in the frame of the Sub-program for droughts and desertification. The number of the environmental migrants in the 'law of nations' is an unknown figure as well (Biermann, 2001).

The *Geneva Refugee Convention* of 1951 does not identify environmental degradation as a cause for flight and therefore does not offer environmental migrants protection, as long as they do not fulfill the criteria of the Convention, i.e. as long as they are not classified as people leaving their habitat due to their race, religion, nationality, membership of a social grouping and/or political opinion. By this definition, the Convention excludes intra-country migrants among which environmental migrants occur more often as compared to cross-border migration (UNHCR, 2006).

Regional agreements for protecting refugees in Africa and Latin America are more detailed and comprehensive than the Geneva Convention and include further categories of refugees. However, they still do not identify environmental degradation as a flight cause.

The 1949 established United Nations High Commissioner for Refugees (UNHCR) considers the problem of 'environmental migrants' as a minor issue, since environmentally vulnerable people usually enjoy the protection of their governments, and can therefore not be defined as 'refugees' in the strict sense of the refugee right.

Although UNHCR established an 'environment fund' and introduced an 'environment coordinator' in the early nineties, the rationale was to prevent the ecological consequences of mass flight and not vice versa. Therefore, many authors avoid in principle using the term 'Environmental refugees' and rather talk of 'Environmental migrants', in order not to weaken the status of the political refugees, who might be in a more urgent and severe position.

Myers (1997) talks of hundreds of millions of environmental migrants by arguing that people simply cannot find an alternative for protection anywhere else, no matter how their attempts to escape to new places would be risky[7]. However, *Castles* (2002), also supporting *Black* (1998), disagrees on such 'horror scenarios'. He claims that migration is not the main strategy of such people; when their livelihoods worsen, they tend to move from one place to the other within the same region. They rarely cross the country borders. For example, the sea level rise in Bangladesh was not a sudden phenomenon. Therefore, he believes that some parts will be protected by dams and the others will have to be abandoned, but the majority of the people will stay in the country, and only the minority will leave for India.

According to *Traufetter* (2007), a focal point is the reaction of different governments to natural catastrophes. After the earthquake in Kobe, Japan, most of the 300 000 displaced people returned back a few months after the incidence, whereas it took years for people to return after the Pinatubo Volcano in the Philippines. In addition to the loss of livelihoods and income opportunities, a second reason for 'environmental out-migration' is the fear that the impacted area may experience more natural disasters in the near future. While some people do not return after a disaster, the fear of disasters does not prevent some migrants from returning to their homes (Mileti, 1999).

The reaction of governments does not only depend on the financial resources available. Institutional management, including control of corruption, risk communication among different demographic groups, and aid assistance policies affect out-migration after a natural hazard event. The widely-discussed performance of the U.S. evacuation effort during and after Hurricane Katrina may have contributed to specific sections of the population not being able to resettle in their homes in the post-hurricane period (Renaud et al. 2007). For example, public housing in which many welfare-dependent African American families lived were deemed unfit for dwelling, yet the inhabitants were not offered local housing alternatives following the hurricane and moved elsewhere (Laska 2007). Disasters can also attract inward migration, as in the case of the tornado of 2004 in North-central Bangladesh. *Paul* (2005) found that emergency aid can compensate in monetary terms for damage caused by disasters.

Thomas Faist (2007) warns of 'too sharp' expressions concerning environmental migration. He agrees that climate change is a considerable problem, believes however, that people leave their habitats due to ethnic, economic and political problems, and that climate merely serves as a catalyst. He also expects that most of the affected people are the poor, and therefore, they do not have the means to migrate across regions, not to mention from one country to the other.

In order to transform this debate into a quantitative analysis based on real data and numbers, we attempt to find out whether there is a direct impact of environmental degradation in one country on the migration flow out of this country by running a gravity regression model as will be shown in the following section.

In the following, two key environmental problems in Egypt, namely water shortage and land degradation are demonstrated. Later on, the link between these two factors and migration in Egypt is assessed.

[7] Myers comes up with similar idea in Myers, Norman (2005).

3. A general overview of migration in Egypt

Since the paper is concerned with migration induced by environmental problems, particularly water shortage and land degradation, it focuses on emigration rather than immigration. Unfortunately, there is a big lack of data about internal migration in Egypt. The reason for that could be the fact that many Egyptians move from one region/city to the other within one day, due to work obligations, and therefore, it is hard to calculate the exact number of people who moved and really settled in the different cities. Moreover, it is easier to monitor the numbers of people who crossed the country borders, since all the movements are documented in contrast to the internal movements.

The Egyptian constitution considers emigration as a basic right for the Egyptian citizens. This was confirmed by Article 52 of the permanent constitution released in the year 1971 and stating that: "…..The Egyptian citizens are entitled to emigrate permanently or temporarily….."

To apply the constitution, the Law 111 for Egyptian emigration abroad was released in the year 1983. Article 1 of the Law 111 gives the right of the Egyptian citizens to emigrate individually or in groups, permanently or temporarily, reserving their right to keep the Egyptian nationality, and in this case they do not lose their constitutional or legal rights.

In order to encourage the Egyptian emigrants abroad to keep the ties with their mother country, Article 15 of Law 111 gives them the privileges of carrying other nationalities, receiving social assistance and pensions, having an Egyptian passport re-issued abroad, exempting their investments in Egypt from certain taxes and duties and re-occupying one's job two years after resignation from the government sector (Egyptian Ministry of Manpower and Migration).

The majority of Egyptian labour migrants are expected to return home eventually, but thousands leave their country each year with the intention of permanently resettling in various Arab countries, Europe, or North America. These emigrants tended to be highly educated professionals, mostly doctors, engineers, and teachers (Zohri, 2006). Iraq was the Arab country most likely to accept skilled Egyptians as permanent residents. Besides the Arab countries, the United States was a preferred destination.

According to the official estimates of the Central Agency for Public Mobilization and Statistics (CAPMAS), the total number of Egyptian temporary migrant labourers (in Arab countries) is about 1.9 million (CAPMAS 2001). The top 5 of destination countries are: Saudi Arabia (48.3 percent), Libya (17.4 percent), Jordan (11.9 percent), Kuwait (10 percent) and UAE (United Arab Emirates, 5 percent) (Table 1).

Table 1: Temporary Egyptian migrants by country of destination

Receiving Country	Number of migrants	Percentage
Saudi Arabia	923,600	48.3
Libya	332,600	17.4
Jordan	226,850	11.9
Kuwait	190,550	10.0
UAE	95,000	5.0
Iraq	65,629	3.4
Qatar	25,000	1.3
Yemen	22,000	1.2
Oman	15,000	0.8
Lebanon	12,500	0.7
Bahrain	4,000	0.2
Total	1,912,729	100.0

Source : CAPMAS (2001)

From the beginning of the 1960s, political, economic, and social developments led Egyptians to migrate permanently to the USA and European countries. According to the estimates of CAPMAS, the total number of permanent Egyptian migrants in non-Arab countries is slightly more than 0.8 million (824,000) (Table 2). About 80 percent of them are concentrated in five countries: USA (318,000 or 38.6 %), Canada (110,000 or 13.3 percent), Italy (90,000), Australia (70,000), and Greece (60,000). The other 20 percent are mainly in Western Europe countries, such as Holland, France, England, Germany, Switzerland, Austria, and Spain (CAPMAS 2000).

Table 2: Permanent Egyptian migrants by country of destination

Country of Destination	Number in Thousands	Percent
U.S.A	318	38.6
Canada	110	13.3
Italy	90	10.9
Australia	70	8.5
Greece	60	7.3
Holland	40	4.9
France	36	4.4
England	35	4.2
Germany	25	3.0
Switzerland	14	1.7
Austria	14	1.7
Spain	12	1.5
Total	824	100.0

Source : CAPMAS (2000) - 'The United Evaluation 2000'

The statistics given by CAPMAS are just estimates which are drawn from the reports of Egyptian embassies abroad, records of cross-border flows from the Ministry of Interior, emigration permits from the Ministry of Manpower, and some other sources. The receiving countries make different estimates than CAPMAS. For example, the Italian government estimates there are around 35,000 Egyptians in Italy whereas CAPMAS gives a figure of 90,000.

Logically, there are no concrete or reliable figures about illegal migration. Nevertheless, there are tens - if not hundreds - of Egyptians who were caught in the past years after illegally attempting to cross the Mediterranean to reach Italy, Malta and Spain. The source of information is usually the newspapers, but there are no real statistics that cover the phenomenon. When arrested, most of them mention poverty and unemployment as main reasons. None of them - to the knowledge of the author - mentions political or environmental reasons.

This general overview gives an idea about the general trends and figures. However, it does not classify the migrants according to the reason(s) for migration, simply due to the lack of data and interest in the topic 'environmental migration'. In the following, the environmental problem in Egypt, particularly water shortage and land degradation are demonstrated. Later the paper attempts to detect the link between these environmental factors and migration in Egypt.

4. Water shortage in Egypt

The 'Nile water' as a political issue in Egypt issue backs at least to the 19th century. With the fall of the Arabic Empire in the eighties of the same century, the Egyptian Project for the Political and Water Union of the Nile Basin Region had an end as well, and the British occupation in Egypt took place starting from the year 1882, where the British Empire had not only Egypt but also Sudan, Uganda, Kenya and British Somalia[8] under control. Most importantly in this context was the British control over the waters of these countries. In the Egyptian case, Great Britain (GB) gave a special priority to the water issue by hiring a number of British experts and consultants in the Egyptian Ministries of Agriculture and Irrigation, especially that the population was increasing and that the cultivated lands were extended.

In the year 1929 an Agreement was signed between Egypt on one hand and GB on behalf of Sudan, Uganda and Kenya, on the other, where the quota of each country's water consumption was determined. A similar Agreement was signed in the year 1939 where the terms were some details were changed, followed by another Agreement signed by Egypt and GB in the year 1949 concerning the construction of small damns and water falls, in order to generate power. The Egyptian Revolution of 1952 triggered the importance of the Egyptian water as a 'national' asset. This lead to the High Dam Agreement signed with Sudan in the year 1959 to determine both countries' yearly shares of water consumption. In the year 1978 Egypt commenced an Official Plan for Water Resources which was extended by a so called Master Plan that was initiated by the Egyptian Ministry for Irrigation and Water Resources in the year 1981 to save the water for the future generations and to use the most rational irrigation methods (Ouda, 1999). Egypt is planning the Toshka Canal as well, which is supposed to pump part of the Nile water into the Western Desert, a sensitive topic for some other Nile Basin countries (Stroh, 2004).

In spite of all these Agreements and plans, and as much as the Nile River has been a generous water resource for Egypt, the Egyptians are suffering from water shortage, due to the limited Egyptian quota from the Nile - according to its agreement with the 10 Nile Basin countries - as well as the continuous increase in population at high rates. Taking the

[8] The rest of Somalia was occupied by Italy.

expression ‘water shortage’ more broadly, it would encompass the access to clean water that is suitable for drinking and irrigation; unfortunately, Egypt has been notorious for water pollution, since the Nile and its canals have been subject to industry, agricultural and individual wastes for the past decades. Poor water management due to inefficiency of the traditional gravity irrigation system, inadequate maintenance of irrigation and drainage networks and over abstraction of ground water, especially in the newly reclaimed desert areas, are all factors that magnified the problem. Another natural factor that diminishes the available fresh water is the water salinity, a phenomenon that largely exists in the newly reclaimed desert lands that rely on ground water.

5. Land degradation in Egypt

There are different causes for land degradation in Egypt; a number of irrigated farmlands in the Nile Valley and Delta as well as the newly reclaimed desert lands are suffering from soil salinity. This has reduced the productivity and increased in the duration required for reaching their acceptable productivity level and eventually to their ideal productivity, which in turn caused the loss of effort, money and time. In order to compensate for the low productivity caused by soil salinity, the usage of organic fertilizers, the adoption of irrational agricultural management techniques and excess irrigation was exaggerated, which enhanced the problem and created a vicious circle.

With the beginning of the seventies, the soil pollution impact started due to the excessive use of chemical fertilizers, namely nitrogenous, due to the farmers’ wrong impressions after the construction of the Aswan High Dam (Science Research Academy, 1971 - 1975). Moreover, many nutrient elements of the Nile Valley and Delta soil were depleted and defected by the extensive and frequent cropping, unsustainable irrigation water management and improper agricultural practices. The construction of the Dam itself decreased the annual additions of the fertile sediments to the soils that consequently lost lots of their content of organic matter, total nitrogen and other nutritive elements. Excessive use of chemical fertilizers persisted due to agriculture production intensification and attempts to reach the highest production possible/unit area. Soil pollution has also increased due to the irrationalized use of different pesticides. In addition, wastewater and industrial drainage leakage into watercourses has exacerbated the problem, especially that there was a very poor implementation of pollution control regulations.

Wind erosion is a major cause of land degradation in Egypt, since it exists in the Western and Eastern deserts as well as inland Sinai and the coastal zones. It is mainly caused by the arid climate. The most vulnerable to wind erosion and deposition are sand dunes and other sand forms in the coastal and inland deserts. Since wind erosion clearly leads to the drifting of surface soil layers, the agricultural development, rural and urban settlements, road traffic and public health are negatively affected.

Water erosion occurs in the Northern coastal zone of Egypt where intense rainstorms cause excessive water surpluses leading in turn to enormous soil loss. Nevertheless, the same lands - since these lands fully rely on pluvial irrigation - are very often exposed to periods of dryness, lower rain compared to their annual average and bad distribution of rains during rainy seasons.

Another factor that does not directly lead to land degradation but rather lowers the chances of planting and cropping in Egypt is urban encroachment. It occurred in Egypt due to the expansion of cities and villages and the establishment of industrial facilities and infrastructure. Additionally, soil surface scrapping for manufacturing red bricks was a phenomenon that had a negative impact on fertile lands.

In concrete numbers, around 30 percent of the irrigated farmlands in Egypt suffer from salinity. Of the Northern cultivated land and both Middle and Southern Delta regions, 60 percent and 20 percent, respectively, are considered salt-affected soils. Wind erosion affects about 90 percent of the total country area. The average rate of soil loss due wind erosion in the Western desert Oases has been estimated varies from 4.5 to 66.9 ton/ha/year (Egyptian National Action Program to Combat Desertification, 2002). The area influenced by the active encroachment of sand and sand dunes is estimated to be 1.6 million hectares. Land productivity has diminished by about 25 percent compared to its original productivity (Regional Report on Desertification in the Arab World, 2000). The annual water erosion rate has been estimated between 0.8 and 5.3 ton/ha/year (Egyptian National Action Program to Combat Desertification, 2005). Soil scrapping for manufacturing red bricks has been nearly overcome as a result of the legislation issued in 1983 and amended in 1985 (Egyptian National Action Program to Combat Desertification, 2002). Urban encroachments started during the fifties and caused the loss of 15000 hectares annually (Institute of Lands, Water and Environment, 2000). A military order has then been issued to stop and eliminate such encroachments in 1996, significantly limiting such phenomena, but probably, after it was too late. It is also found that the losses of plant nutrients; nitrogen, phosphorus and potassium are linearly proportional to soil loss (Egyptian National Action Program to Combat Desertification, 2005).

From this brief overview about water shortage and land degradation in Egypt one can sense the serious environmental problems that Egypt is facing, especially that these problems are directly related to the livelihoods of the people. The question would be: Could these environmental factors lead to displacement/migration in Egypt? Who would migrate and where would they go? Would this have implications on security issues? This is what this paper attempts to detect through a field work that was run in different areas in Egypt and where a questionnaire was designed for migrants as well as non-migrants who moved from one place to the other within the Egyptian boarders. The aim was to know from the migrants whether/to what extent water shortage and land degradation influenced their migration decisions and knowing from the non-migrants whether they would leave their lands due to these two environmental problems.

6. Questionnaire and geographic coverage of field work

The 30 migrants[9] that were interviewed were mainly in the centre of the Nile Delta, the Nile Valley (South and North), Eastern and Western Nile Delta, newly reclaimed desert lands and slums of Old Cairo. The questionnaire was semi-structured and included other non-environmental factors that could have led to the migration of interviewees, such as poverty and social problems. The selection of the interviewees was random, due to the limited awareness of the issue and the difficulties of accessing the target groups in an organized way.

[9] Due to time and financial constraints, the number of questionnaires was not big enough to run an econometric model.

The target groups were people who left the Nile Valley and Delta for slums of Old Cairo, people who left the Oasis and moved to Cairo, people who moved from one area to the other within the Nile Valley and Delta, people who moved from fertile lands to the newly reclaimed desert lands, and people who stayed in the Nile Valley and Delta. Due to the relatively limited number of interviewees, the author did not only rely on the information about their personal experiences but also on their stories about their parents, relatives and friends.

7. Field results

Most of the people who left the relatively fertile lands in the Nile Valley and Delta and moved to Cairo were mainly induced by unemployment and poverty problems. However, in most cases land degradation and water shortage were actually the causes for these problems. Even if the migrants would not mention that explicitly, one could indicate it from their answers. The interviewees who mentioned that they left their Oasis in the Western Desert mainly to seek better livelihoods and standards of living in Cairo referred implicitly to the sand dunes that hindered them from planting and shepherding properly in their original home areas. Unfortunately, the migrants who left for the slum of Old Cairo were shocked by the fact that they were running harder lives that they had expected from Cairo. All of them were hoping to find the means to move to richer districts in Cairo, since at the time of the interviews they were suffering from environmental problems as well, such as low access to clean water and other sanitary problems.

People who moved from one area to the other within the Nile Valley and the centre of the Delta had different reasons; some had moved with their parents who worked as peasants or farmers in the early eighties of the last century when the owners of the fertile lands decided to use the latter in construction buildings or soil surface scrapping for manufacturing red bricks. In these cases, their parents were forced to be displaced from the lands, since they neither owned them, nor were there signed contracts that would preserve their right to stay or to be compensated. Others moved within the Valley and the Delta, since they were unemployed, but this group would not dare completely shift to the completely different ‘life style’ of Cairo. Therefore, they moved to similar areas, but where they could find better livelihoods.

Among the latter group, some left their original towns in the Nile Valley and the centre of the Delta for Eastern and Western Delta, where the Egyptian government has initiated two major projects close to the Bahr El-Bakar Canal and the Noubaria Canal, respectively. The main reasons why they moved were again poverty and unemployment. Nevertheless, most of the interviewees and their friends who currently live there were seriously thinking of going back to their home towns or moving to third areas, since they are suffering from environmental problems such as poor access to clean water. For example, Cairo uses the Bahr-El-Bakar Canal as an outlet for its sewage. Moreover, they claim that the infrastructure and housing in these areas are insufficient for a decent life. In addition, the schools are mainly primary rather than secondary.

Another interviewed group were the people who moved to the newly reclaimed desert lands, since they were unemployed in their home towns and were promised to work as peasants in

these lands. However, most of them were suffering from soil and water salinity problems. Some of them even already moved to different areas within the newly reclaimed desert lands mainly because the owners of the lands decided to sell them when they did not have enough financial means to dig for new ground water. No one of these peasants could afford to own a land, and therefore, they were quite mobile and were able to easily move, especially that working on these lands was in most cases the only financial resource for them. Some owners of these lands did not really make their living from the crops planted there; most of them originally lived in Cairo and preferred to spend the rest of their lives away from the air pollution there. Hence, they built their farms in the newly reclaimed desert lands and relied financially on their savings that they gained when they used to work in the capital. When the salinity problem occurs in the ground water, they would not have a problem in digging for new ground water, since they are well off.

Last but not least, a group of interviewees in the Nile Valley and Delta were suffering from water shortage and land degradation. However, since they own the land and feel emotionally attached to it, they would not leave it, even if the pull factors in the city or elsewhere were very strong. As long as they can afford their living, even if it worsened in the past years, they would stay.

None of the interviewees completely left the country. Nonetheless, when some of them mentioned their relatives/friends who crossed to borders, mainly to other Arab rich countries, they mentioned poverty and unemployment as the main reasons, even though these two factors may indirectly be caused by water shortage and land degradation.

8. Implications on security

To date, there is no evidence that migration flows within or from Egypt in relation with environment have affected the security situation in the country or abroad. However, the illegal migrants mentioned in section 3 and who attempt to cross the Mediterranean as well as other Egyptian borders, seeking better livelihood, and whose migration decisions are likely influenced by environmental problems, might induce security problems through two channels; firstly, if they would succeed in leaving the country, they would illegally reside in the countries of destination, at least for a given period of time. In order to survive, they would possibly join illegal activities, such as drug smuggling, which could lead to security threats in the host countries. Secondly, if they would fail to leave the country, they would very likely be a burden on the society, in the sense that they would stay unemployed, since in first place they were planning to leave the country for livelihoods that they missed in their home country. This could also have negative implications on the security, since the severer the poverty and the more the unemployment, the more one would expect disorders to occur.

9. Conclusions

Egypt is generally an outward oriented country, in the sense that the government allows for emigration, as long as it is legal and the reasons are acceptable. On the other hand, environmental problems, such as water shortage and land degradation are certainly important challenges facing the Egyptians, given the rapid population growth. Whether there is a relationship between Egyptian environment and migration, this is what the paper attempts to assess.

It is hard to draw a direct relationship between environment and migration, especially if one attempts to find a precise impact of environmental problems, such as land degradation and water shortage on the migration flows. There are other financial, social and cultural factors that influence a decision to migrate. In addition, both factors do not occur suddenly; it takes decades till one can sense them, which makes the task of finding the link more challenging.

From the results of the field work in Egypt it can be concluded that people in Egypt would be moving/migrating from one place to the other within the country in case of water shortage and/or land degradation only under certain conditions; they would only do that, if they are not land owners, if they can socially and financially afford leaving their place of origin, and/or if they are forced to be displaced by the government or the owners of the land. The water shortage and land degradation factors in Egypt are definitely not strong enough to make people decide to leave the entire country. This would need additional pull factors in the receiving countries such as a big financial return and/or higher living standards on one hand, and/or additional push factors in Egypt, such as poverty or unemployment, on the other. In general, as long as the people are not facing a sudden natural disaster, such as earthquakes or floods, they would not be willing to leave their home.

In the cases were people are willing - and can afford - to leave, especially in an illegal framework, the security question must be raised, since one should expect from people who are desperately seeking better livelihoods and simultaneously facing new cultures to act differently from people whose lives are secure. The same would apply to people who attempted to migrate but were left behind.

References

Biermann, Frank (2001) Umweltflüchtlinge, Ursachen und Lösungsansätze, Aus Politik und Zeitgeschichte, B 12/2001.

Paul, Bimal Kanti (2005) Evidence against disaster-induced migration: the 2004 tornado in north-central Bangladesh Disasters 29 (4), 370–385.

Black, R. 2001. "Environmental Refugees: Myth or Reality?," UNHCR Working Papers(34): 1-19

Bogardi, J.J. and F. Renaud (2006) Migration Dynamics Generated by Environmental Problems. Paper presented at the 2nd International Symposium on desertification and Migrations, Almeria, 25-27 October 2006.

Castles, S. (2001) Environmental Change and Forced Migration, Preparing for Peace Initiative: the website of the Westmorland General Meeting. http://www.preparingforpeace.org/book1.htm

Castles, S. (2002) Environmental change and forced migration: making sense of the debate. In: New Issues in Refugee Research. Working Paper No.70. United Nations High Commissioner for Refugees, Geneva.

Egyptian Ministry of Manpower and Migration http://www.emigration.gov.eg/)

Egyptian National Action Program to Combat Desertification (2002) Arab Republic of Egypt Ministry of Agriculture and Land Reclamation, Desert Research Centre (DRC), Cairo.

Egyptian National Action Program to Combat Desertification (2005) Arab Republic of Egypt Ministry of Agriculture and Land Reclamation, Desert Research Centre (DRC), Cairo.

El-Hinnawi, E. (1985) Environmental Refugees, United Nations Environment Programme, Nairobi.

Faist, Thomas (2007) Umweltflüchtlinge, Interview on German Radio (Deutschlandradio), 3. April 2007
http://www.comcad-bielefeld.de/cgi-bin/pagemaker.pl?name=aktuelles

Global Migrant Origin Database, Development Research Centre on Migration, Globalization and Poverty.
http://www.migrationdrc.org/research/typesofmigration/global_migrant_origin_database.htm

Grote, U. and S. Engel, B. Schraven (2006) Migration due to the tsunami in Sri Lanka – Analyzing vulnerability and migration at the household level, ZEF-Discussioni Paper on Development Policy No. 106, Centre for Development Research (ZEF), Bonn, April 2006.

Institute of Lands, Water and Environment (2000) Land Degradation in the Nile Valley and Delta, Agriculture Research Center, Giza.

Jakobeit, C. and C. Methmann (2007) Klimaflüchtlinge, Eine Studie im Auftrag von Greenpeace, Fakultät Wirtschafts- und Sozialwissenschaften, Universität Hamburg.

Mileti, Dennis S. (1999) Disasters by Design: A Reassessment of Natural Hazards in the United States. Joseph Henry Press, Tokyo.

Myers, N. 1997. "Environmental Refugees," Population and Environment 19(2): 167-82.

Myers, Norman (2005) Environmental Refugees: An Emergent Security Issue, 13th Economic Forum, Prague, 23-27 May 2005.

Ouda, Abdel Malak (1999) 'Egyptian Policy and the Nile Water in the 20th Century', Centre for
Political and Strategic Studies, Ahram News Agency, Cairo.

Regional Report on Desertification in the Arab World (2000) Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD), Damascus.

Renaud, F. and J.J. Bogardi, O. Dun, K. Warner (2007) Control, Adapt or Flee: How to Face Environmental Migration?, InterSecTions No. 5/2007 , United Nations University, Institute for Environment and Human Security.

Science Research Academy (1971 - 1975) Impact of reduced Nile alluvial, Cairo.

Stroh, Kassian (2004) 'Konflikt und Kooperation um Wasser: Eine Fallstudie über den Nil', Arbeitspapier zu Problemen der Internationalen Politik und der Entwicklungsländerforschung, Geschwister-Scholl-Institut für Politische Wissenschaft der Ludwig-Maximilians-Universität München.

Traufetter, G. (2007) Legende vom Exodus, der Spiegel, 07.04.2007

United Nations High Commissioner for Refugees (UNHCR) (2006), Convention and Protocol Relating to the Status of Refugees: Text of the 1951 Convention Relating to the Status of Refugees, Text of the 1967 Protocol Relating to the Status of Refugees, and Resolution 2198 (XXI) adopted by the United Nations General Assembly, UNHCR, Geneva.
http://www.unhcr.org/protect/PROTECTION/3b66c2aa 10.pdf, 4 July 2007.

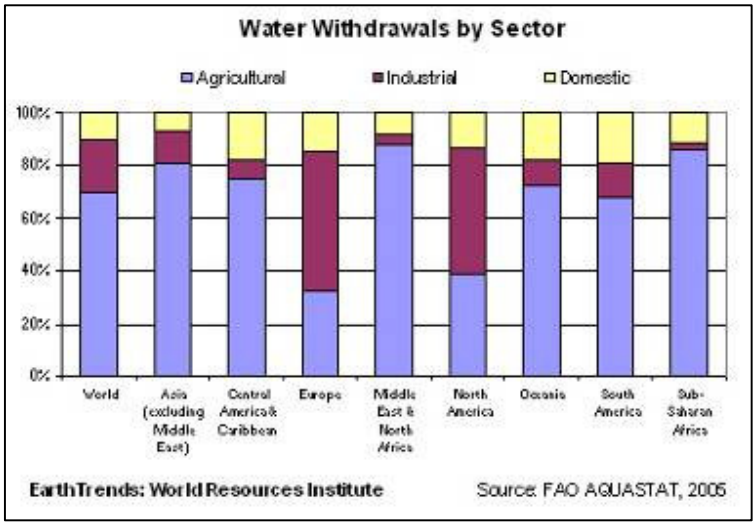
Introductory remarks to the Working Group IV: Managing water scarcity- Prof. Mohamed BADRAOUI

Defined as the annual availability of less than 1000 cubic meters of water per person, water scarcity already affects 40 % of the world population. This proportion will increase to 66 % by 2025 as a result of population growth, climate change and water pollution.

According to the latest report from the United Nations Intergovernmental Panel on Climate Change (IPCC), global warming is likely to have a number of adverse effects on human and natural systems. The main effects are listed below:

- increased frequency and intensity of droughts;
- increased snowmelts;
- rising sea levels;
- flooding;
- land degradation (desertification);
- declines in food production;
- increased disease;
- more frequent extreme weather;
- loss of biodiversity.

Water scarcity is partly due to the uneven geographic distribution of water resources. The Mediterranean region, the sub-Saharan countries and the Middle East are the most affected areas. In these parts of the world, water use is expected to increase with population growth and the demand for water may double by 2050. In these contexts, steps must be taken to improve the way water is managed (figure 1).



In fact, according to FAO, water withdrawal by the agricultural sector exceeds 80 % in the most affected regions by water scarcity.

It is demonstrated by many organisations that the adaptive capacity to water scarcity and climate change relates closely to the society's "level of wealth, education, institutional strength, and access to technology". The combination of high exposure and low adaptive capacity occurs most commonly in south Mediterranean countries, making them highly vulnerable to climate change.

Selected solutions could be proposed for the most affected countries to improve their adaptive capacity, such as:

- Technological changes to increase water-use efficiency and agricultural intensity;
- Scaling-up of infrastructure;
- Adoption of sustainable water management practices;
- Strengthening of public and private partnerships;
- Sharing of both responsibility for water management and its economic and social benefits.

In addition, some paradigm shifts should be performed in order to overcome water scarcity. The main shifts concern:

- Demand driven management vs. Mobilization;
- Water use efficiency : localized and pressurized irrigation systems instead of surface and flood irrigation;
- Integrated water management: new water governance;
- Integrated Watershed Management: soil and water conservation and livelihood improvement in upstream of the river basins ;
- Desalination of sea water.

Would desalination be the solution to water scarcity?

Despite technological improvements, desalinated water cost still high compared to the production of drinking water from typical sources. The price varies widely depending on: the salinity of the input water, the energy requirements of the process, the quality of the final waste product, and the distance that the freshwater must be transported. The price will likely decrease with future research and desalination will certainly continue to play an important role in water scarce countries with large coastal populations.

ANNEX II

Agenda

OSCE Chairmanship / NATO Workshop on

"Water Scarcity, Land Degradation and Desertification in the Mediterranean Region - Environment and Security Aspects"

"Museo de las Ciencias Príncipe Felipe"
City of Arts and Sciences

Valencia, Spain
10-11 December 2007

With the support of: Centro de Investigaciones sobre Desertificación- CIDE (CSIC, Universitat de Valencia, Generalitat Valenciana) and Conselleria de Medio Ambiente, Agua, Urbanismo y Vivienda, de la Generalitat Valenciana

10 December 2007		
09:15 – 10:00	**Opening Plenary**	**Moderator: Mr. Bernard Snoy,** Co-ordinator, OSCE Economic and Environmental Activities
	• Welcoming of participants and presentation of the agenda	**Ambassador Jose Angel López-Jorrin** Head of the OSCE Task Force Ministry of Foreign Affairs, Spain, OSCE Chairmanship **Jorge Lamparero** General Director Conselleria de Medi Ambient, Aigua, Urbanisme i Habitatge. Generalitat Valenciana
	• Objectives of the workshop and brief introduction to the background paper	**Mr. Bernard Snoy** Co-ordinator, OSCE Economic and Environmental Activities **Dr. Fausto Pedrazzini** Programme Director NATO Public Diplomacy Division. Rapporteur: Raul Daussa
10:00 – 11:00	**Plenary Session I**	**Keynote Speakers**
	Environmental Conditions in the Mediterranean Region: Possible future Scenarios *Status of Desertification in the Mediterranean Region*	**Mr. Henri-Luc Thibault** Director of UNEP Blue Plan **Prof. Uriel Safriel** Hebrew University of Jerusalem Department of Evolution Systematics and Ecology (ESE) Silberman Institute of Life Sciences Rapporteur: Gabriel Leonte
11:00 – 11:30	**Coffee / tea break**	

11:30 – 12:30	**Plenary Session II**	**Keynote Speakers**
	Reviewing Land Use and Security Aspects in the Mediterranean Region *Water scarcity and Desertification as a Security Challenge in the Mediterranean Region*	**Prof. Winfried E.H. Blum** University of Natural Resources and Applied Life Sciences (BOKU), Vienna **Dr. José L. Rubio** Centro de Investigaciones sobre Desertificación – CIDE – CSIC Valencia Rapporteur: Raul Daussa
12:30-13:30	**Parallel Working Groups** • WG I – Security Implications of Unsustainable Water Management and Land Use	**Facilitators:** **Prof. Uriel Safriel** **Prof. Winfried E.H. Blum** Rapporteur: Vicente Andreu
	• WG II - Loss of Livelihoods and increased Migration	**Dr. Tamer Afifi** United Nations University-Institute for Environment and Human Security **Bonn** **Dr. David Mouat** Desert Research Institute, Division of Earth and Ecosystem Sciences, USA **Dr. José L. Rubio** Rapporteur: Philip Reuchlin
13.30 – 15.00	**Lunch**	
15:00 – 16:00	**Working Groups Continuation**	
16:00 – 16:30	**Coffee / tea break**	
16:30 – 17:30	**Plenary Session:** Working Group Reports	**Working Group Facilitators**
21:00	**Dinner**	

11 December 2007		
9.30 – 10.30	**Plenary Session III**	**Moderator: Dr. Fausto Pedrazzini**
	Overview of the UNCCD study on "Securing the ground, grounding security"	**Mr. Grégoire de Kalbermatten** Deputy Executive Secretary UNCCD
10:30 – 11:30	**Parallel Working Groups:**	**Facilitators**
	• WG III – Linkages between Combating Land Degradation, Desertification and Conflict Prevention	**Mr Boubacar Cisse** UNCCD Secretariat **Bonn** **Dr. Abdel Gilil** UNCCD Focal Point - Egypt **Cairo** Rapporteur: Gabriel Leonte
	• WG IV – Managing Water Scarcity	**Prof. Mohamed Badraoui** Director of the fight against Desertification and Nature Protection **Rabat** **Mr. Javier Ferrer** Head of Water Planning Unit - Jucar River Basin Authority and Vice-President of the Mediterranean Network of Basin Organisations **Valencia** Rapporteur: Philip Reuchlin
11.30 – 12.00	Coffee / tea break	
12:00 – 13:00	Working Groups Continuation	
13.00 - 14.30	**Lunch**	
14:30 – 15:30	Working Group Reports	**Working Group Facilitators**
15:30 – 16:00	**Coffee / tea break**	
16:00 – 17:00	**Closing Plenary**	**Moderator: Dr. José L. Rubio**
	The role of the OSCE and NATO, and other competent organizations in raising awareness about environment and security aspects in the Mediterranean Region	**Mr. Marc Baltes** Senior Adviser, OSCE Economic and Environmental Activities **Dr. Fausto Pedrazzini, Mr. Henri-Luc Thibault, Mr. Boubacar Cisse and Mr. Grégoire de Kalbermatten** Rapporteur: Gabriel Leonte/ Raul Daussa

Background Paper

Background Paper

OSCE Chairmanship / NATO Workshop on

"Water Scarcity, Land Degradation and Desertification in the Mediterranean region - Environment and Security Aspects"

"Museo de las Ciencias Príncipe Felipe"
City of Arts and Sciences
Valencia, Spain
10-11 December 2007

Contact Information for comments on this background paper	
José Luis Rubio jose.l.rubio@uv.es President of the European Society for Soil Conservation Centro de Investigaciones sobre Desertificación-CIDE (CSIC,Universitat de Valencia, Generalitat Valenciana) Cami de la Marjal, s/n Apartado Oficial 46470 Albal (Valencia) Spain Tel.:+ 34 96 1220540	**Raul Daussa** raul.daussa@osce.org Environmental Programme Officer Environmental Security and Co-operation Unit Office of the Co-ordinator of OSCE Economic and Environmental Activities raul.daussa@osce.org OSCE Secretariat Karntner Ring 5-7 A-1010 Vienna www.osce.org/eea Tel. + 43 1 514 36 237

[1] The document uses a restrictive notion of the Mediterranean region, limited to the OSCE Mediterranean Partners for Co-operation (Algeria, Egypt, Israel, Jordan, Morocco and Tunisia) and the NATO Mediterranean dialogue (all the OSCE Mediterranean partners, plus Mauritania).

1. Executive Summary

Based on the suggestions made by the speakers of Plenary Session IV "Challenges to the management of water resources and to countering desertification in the Mediterranean region" during the 15th Economic and Environmental Forum, the OCEEA proposed to organize a workshop on "**Water Scarcity, Land Degradation and Desertification in the Mediterranean region - Environment and Security Aspects**".

In order to build on common synergies, OSCE sought co-operation with colleagues from NATO, in particular from the Science for Peace and Security Programme. NATO has a longstanding expertise on the issue and had organised in Valencia, in December 2003, a NATO scientific Workshop on "Desertification and Security in the Mediterranean Region". The objective of the new proposed workshop would be to broaden its focus from the scientific community to include also policy makers.

The workshop, aimed at government officials from the Mediterranean Region[10], would gather representatives of Water management, Land degradation and Desertification Departments of Ministries of Environment and representatives from the Ministries of Foreign Affairs. In addition, policy makers, scientists and experts will also be invited. The aim would be to discuss how the OSCE, NATO and other competent organizations like the UNCCD, UNEP MAP, and the EU could play a role in ensuring that environment and security linkages in terms of water scarcity, land degradation and desertification are addressed in the Mediterranean Region.

2. Introduction

The Mediterranean Region has been identified as one of the most vulnerable areas in terms of environment and security linkages. Due to its climatic and topographic features, as well as the cross-boundary dimension of the Mediterranean Basin, intermixed with cultural, political and economic diversity, the region represents an area that poses potential for social and political instability, with repercussions for the whole OSCE region, in particular for Europe.

Since its establishment, the OSCE has maintained special relations with its six Mediterranean Partners for Co-operation: Algeria, Egypt, Israel, Jordan, Morocco and Tunisia. The grounds were established in the Helsinki Final Act that included a chapter on questions relating to Security and Co-operation in the Mediterranean, highlighting the interlinkages between the OSCE region and its Partners for Co-operation. NATO also includes Mauritania in its Mediterranean Dialogue.

With this in mind, and with a view to enhance the political dialogue and co-operation on combating environmental challenges in the Mediterranean Region among OSCE participating States and Mediterranean Partners for Co-operation, Plenary Session IV of the 2nd Part of the 15th OSCE Economic and Environmental Forum was devoted to discussing

[10] The document uses a restrictive notion of the Mediterranean region, limited to the OSCE Mediterranean Partners for Co-operation (Algeria, Egypt, Israel, Jordan, Morocco and Tunisia) and the NATO Mediterranean dialogue (all the OSCE Mediterranean partners, plus Mauritania).

"**Challenges to the management of water resources and to countering desertification in the Mediterranean region"**. The session gave an overview of the challenges of sustainable water and land management in the region and presented some best-practices in addressing the issue.

The speakers of the session concluded that the OSCE, in co-operation with other relevant international organizations, NATO in this case, had a role to play in countering desertification and unsustainable management of water resources. They recommended that the Office of the OSCE Co-ordinator on Economic and Environmental Activities (OCEEA) could facilitate a workshop to bring experts together to discuss these issues and begin to co-ordinate institutional actions addressing the existing challenges. (EF.GAL/13/07)

3. Background

The environmental vulnerability of the Mediterranean region

The Mediterranean region is a highly vulnerable area. Extreme weather events which are likely to increase under the warming trend will have severe implications on desertification, land degradation, and water availability.

Due to its geographical position, great parts of the Mediterranean region have an arid, semi-arid and dry-sub humid climate and subject to seasonable droughts and seasonable rainfalls. Hence, the sustainable use and management of land and water resources is of particular importance. The Report of Stockholm International Water Institute mentions that "Continued water scarcities will affect the Region's social and economic potential, increase land vulnerability to salinization and desertification and raise the risk for potential conflict around the limited water available."[11]

Further pressure on the Region's natural resources stem from rapid population growth. The concentration of great parts of the population in small territories that are fertile and where main economic activities are located, such as in coastal areas, often lead to overexploitation of land and water resources in these areas. The availability of fresh water resources is steadily decreasing as population grows, thus urgently calls for new governance patterns.

Irrigated agriculture, currently responsible for about two-thirds of the water consumption in the Mediterranean Region, further increases the demand for water resources. Furthermore, poor agriculture practices and unsustainable management of land contributed to deforestation, soil erosion, biodiversity loss and of soil fertility.

In brief, due to a series of natural hazards the Mediterranean Region's natural resources are particular vulnerable. Hence, there is a pressing need for finding ways of sustainable use and management of the vital land and water resources, in order to reduce negative human impacts and to prevent conflicts for scarce resources and enable human development in the Region.

[11] Water Scarcity Challenges in the Middle East and North Africa (MENA) – Human Development Report Office, Occasional Paper, 2006, by Håkan Tropp and Anders Jäkerskog, Stockholm International Water Institute (SIWI)

Good governance as key for dealing with scarce resources

Human activities may increase the vulnerability of natural resources. Therefore, good governance of scarce resources is a key to ensure sustainability, especially in regards to allocation, in order to prevent conflicts between states and also between the relevant stakeholders within states.

Good governance is based on transparent processes, open access to information and the involvement of all relevant stakeholders in decision-making processes. Sound legal and institutional arrangements need to be put in place in order to ensure that decision-making systems are responsive to the existing challenges.

UNDP defines water governance as encompassing "Political, economic and social processes and institutions by governments, civil society and the private sector to make decisions about how best to use, develop and manage water resources.[12]

Thus, improving the governance of natural resources may not only contribute to sustainable development but will also positively influence the stability of societies and strengthen institutions and their legitimacy.

4. Definitions

Environmental Security

For the purpose of this paper, Environmental Security refers to the impact of environmental factors on security. These environmental factors include both natural environmental phenomena, such as natural disasters, and environmental changes caused by human activity such as depletion of natural resources, loss of biodiversity and climate change. The impact of human activity on the environment can, however also be positive and depends on the quality of governance as it applies, among others, to the use and management of natural resources.

Desertification and Land Degradation[13]

Desertification means the land degradation in arid, semi-arid and dry-sub humid areas. Land is the terrestrial bio-productive system that comprises soil, vegetation, other biota, and the ecological and hydrological processes Land degradation means loss of the biological and economic productivity of rainfed or irrigated cropland, or range pasture, forests and woodlands resulting from various factors, including climatic variations and human activities such as unsustainable land uses.

[12] United Nations Development Programme (UNDP). 2004, Water Governance for Poverty Reduction. Key Issues and the UNDP Response to Millennium Development Goals, New York, 10

[13] Desertification is defined by the UNCCD as land degradation in the drylands, and further explains that land degradation is reduction of biological or economic productivity in the various land uses (e.g. rangelands, croplands, etc.). The Millennium Ecosystem Assessment further elaborated on this definition, stating that desertification is a persistent reduction in productivity. It should be noted that land degradation occurs not only in Mediterranean drylands but also in humid areas in the Mediterranean region, thus when the term "desertification" is used, this applies only to drylands; when "land degradation" is used, this applies to all regions, and when the two of them are jointly used, this it to emphasize addressing to land degradation in both drylands and non-dryland areas.

5. Annotated Agenda for the Workshop

Opening Plenary

Following the welcoming of the participants by the OSCE Chairmanship, the agenda of the workshop will be presented, reiterating the objectives, methodology, and organization modalities of the working groups.

Plenary Session I:

Environmental Conditions in the Mediterranean Region. Possible future Scenarios followed by discussion.

The purpose of Plenary Session I is to gain better insights on specific conditions in the Mediterranean region in terms of climate and topography, as well as the cross-boundary dimension of the Mediterranean Basin and their implications on environment and security.

The presentation of a keynote speaker from UNEP MAP on scenarios for 2050 will illustrate the implications on the stability of the region if non-sustainable land use practices are continued. The presentation will highlight the current threats to the environment and the implications of existing policies. Moreover, with the increasing threat of climate change which will have an acute effect in the Mediterranean Region, the scenario setting will facilitate the selection of priority areas where attention is needed.

Plenary Session II

Reviewing Environment and Security Linkages

Against the background of the specific conditions of the Mediterranean Region, as presented in the previous Session, the challenges of land degradation and water scarcity in the region and implications on national, regional and international security shall be reviewed.

Emphasis will be placed on how human activities contribute to further degradation of land (high concentration of industry, poor agriculture practices, rapid urbanization, and unsustainable tourism policies).

Working Groups:

Building on the preceding presentations and discussions, the Plenary will be divided in two working groups, in order to explore the most pressing threats in the region in more detail.

The Working Group session will end with a Plenary reporting session where each Working group facilitator will summarize the key conclusions of the Working Group sessions, including recommendations on how the particular challenges can be addressed in the most effective and efficient manner.

- WG I – Security Implications of unsustainable water management and land use

The rapid expansion of urban areas leads to the loss of natural and agriculture spaces. Especially, coastal regions represent an area for diverse economic activities. The growing transport, tourism and industrial infrastructure in coastal areas also lead to increased pressure on, and degradation of natural resources. In order to tackle these challenges, there is an urgent need for improved town planning and in particular for diversifying economic activities and tourism policies.

- WG II – Loss of livelihoods and increased migration.

Due to its climatic and topographic conditions, some areas of the Mediterranean Region do not provide optimal conditions for productive agriculture. Overgrazing and over-tilling leads to further depletion and degradation of natural resources and often result in an increased number of economic and environmental induced migrants within countries, from rural to urban regions, but also between states. The resulting increase in the population density often leads to un-managed urban expansion and puts further pressure on urban infrastructure, in particular in terms of waste management, water supply and transport, hence to intensified competition for resources. On the other hand, the increasing migration flows to urban area leads to abandoned agriculture lands.

The main issue to be discussed in this session will be the challenge to identify in how far environmental factors can be identified as one of the main causes for migration in the Mediterranean region. A key research project on this subject will be briefly presented by the facilitator “Environmental Change and Forced Migration Scenarios” (EACH-FOR). EACH-FOR is a research project within the frames of FP6 (PRIORITY [8.1] - Policy-oriented research) of the European Commission. The project will produce detailed sub-region or country level forced migration scenarios, including environmentally induced migrants; presentation of causes leading to forced migration, with focus on environmental concerns; and an online running "environment degradation caused forced migration" simulation model for demonstration and policy purposes.

Plenary Session III

Improving land-use planning schemes and the management of water resources and soil require necessary institutional and participative mechanisms that provide for the better use of existing scarce and fragile resources and the sustainable allocation of water resources between competing sectors. Transparent decision-making processes and active participation of users and other stakeholders is crucial for creating a framework for the sustainable use of natural resources.

Presentations of best practices from the Mediterranean region will illustrate how to address challenges of good governance with regard to land and water resources at national, regional and international level, in order to ensure the sustainable use of the existing scarce natural resources.

Working Groups:

Building on the preceding presentations and discussions, the Plenary will be divided in two working groups, in order to explore the most pressing threats in the region in more detail.

The Working Group session will end with a Plenary reporting session where each Working group facilitator will summarize the key conclusions of the Working Group sessions, including recommendations on how the particular challenges can be addressed in the most effective and efficient manner.

- WG III – Linkages between Combating Land Degradation, Desertification and conflict prevention

Being subject to extreme climate conditions, population densities, heavy concentration and intensive agriculture, soil in the Mediterranean Region is particularly prone to degradation and desertification. As soil degradation and desertification may contribute to scarcity of water and vice versa, combating land degradation requires an integrated approach that takes into account water management and also addresses agricultural and industrial issues. Being a common threat in the region, land degradation calls for transboundary solutions. Land degradation/desertification/drought and their associated impacts constitute a clear, growing and global threat to economic sustainability, social cohesion and public security.

Sound governance in land management as well as rehabilitation of degraded land require a participatory approach including all relevant stakeholders, transparent decision-making processes as well as the accountability of governmental institutions. Appropriate management of land could lead to a sustainable use of the land and thus prevent the exacerbation of poverty and the negative impact on social order and stability.

- WG IV – Managing water scarcity

In this Working Group participants will explore Water scarcity due to both quantities and qualities, and the need for sound management practices. Water scarcity due to climate variability and increasing demand for water can be a source of conflict, but on the other hand, it can also trigger cooperation. Examples and best practices on water management co-operation will be discussed. Finally, Water scarcity can be alleviated by creating new sources of water: Recycling of wastewater and water desalination.

Closing Plenary

The role of the OSCE and NATO, and other competent organizations in raising awareness about environment and security linkages in the Mediterranean Region

This session will discuss the role of the OSCE and NATO in raising awareness about environment and security linkages in the Mediterranean, based on both Organizations' mandate and capacities and considering the existing initiatives in this area. The purpose is to discuss possible follow-up activities, taking into account the recommendations reached at the workshop.

- Replicating the model of Public Environmental Information Centres in the Mediterranean Region;
- Supporting governments in creating incentives for promoting the development and use of new technologies;

- Capitalising on best practice experience and stimulating political will at the highest level.

6. Background information on the OCEEA and NATO Science for Peace and Security Programme

- The OSCE Co-ordinator of Economic and Environmental Activities

Although not primarily an economic organization, the OSCE is involved in economic and environmental activities, operating on the premise that promoting economic prosperity and co-operating on environmental problems can contribute to the enhancement of international security and stability.

The OSCE promotes a continuous dialogue through regular meetings of its permanent bodies in Vienna such as the Permanent Council, and the Economic and Environmental Committee. Economic and Environmental Officers operate on the ground in the OSCE Field Presences in South-Eastern Europe, Eastern Europe, the Caucasus and Central Asia.

The Co-ordinator of OSCE Economic and Environmental Activities, acting in support of the Chairman-in-Office, is charged with strengthening the ability of the Permanent Council and the OSCE institutions to address economic, social and environmental aspects of security.

The Co-ordinator's regular priorities are:

- to enhance the OSCE's interaction with relevant international organizations;
- to strengthen the economic, environmental, and social components in the work of OSCE missions and field activities;
- to deepen interaction with the OSCE Parliamentary Assembly;
- to broaden OSCE contacts with non-governmental organizations and the private sector;
- to formulate a programme of work for appropriate additional activities in, and relating to the OSCE's economic dimension.

The Co-ordinator, who works under the direct supervision of the Secretary General, is assisted by an office staff of 16 persons.

(More information on www.osce.org/eea)

- OSCE Mediterranean Partners for Co-operation

The OSCE maintains special relations with six Mediterranean Partners for Co-operation: Algeria, Egypt, Israel, Jordan, Morocco and Tunisia.

This relationship goes back to the Helsinki Process and the Helsinki Final Act, which included a Mediterranean chapter stating that security in Europe is closely linked with security in the Mediterranean as a whole. This inter-linkage has been underscored in subsequent CSCE/OSCE documents, such as the Istanbul Charter for European Security and the Maastricht OSCE Strategy to Address Threats to Security and Stability in the XXI

Century. Permanent Council decision 571 decided to explore new avenues of co-operation and interaction and to explore the scope for wider sharing of OSCE norms, principles and commitments.

Over the years, the OSCE has been able to share its experience with the Mediterranean Partners for Co-operation on a number of topics, including OSCE economic and environmental dimension commitments. Through ongoing dialogue and joint activities with the Mediterranean Partners for Co-operation, the OSCE shares its expertise and provides insight into current developments and is open to reciprocal enrichment provided by them.

- The NATO Science for Peace and Security Programme

The **Science for Peace and Security Programme (SPS)** sponsors practical cooperation between scientists from NATO member, Partner and Mediterranean Dialogue countries on security-related issues in the fields of civil science, environment and technology. The programme seeks to develop recommendations and solutions for a variety of problems in these fields, as well as to respond to the needs of partner countries. Overall the aim is to contribute to security, stability and solidarity among NATO Partnership for Peace as well as Mediterranean Dialogue nations, by facilitating collaboration, networking and capacity-building, while promoting the application of the best technical expertise to problem solving. The SPS Programme is overseen by a specific Committee, which is subordinate to the North Atlantic Council and also advises the Council and other NATO bodies on security-related civil scientific, environmental and technological issues.

The SPS Programme offers grants for collaboration between scientists in NATO member states and countries which are associated with NATO through the Euro-Atlantic Partnership Council and through the Mediterranean Dialogue. Activities consist of workshops, training courses, exchange of experts and longer-duration projects, which lead not only to the formulation of specific recommendations but also to tangible products, capacity –building and the creation of international networks of scientists. Staff support for the SPS Committee is provided by a secretariat in NATO's Public Diplomacy Division, under the direction of the Assistant Secretary general for Public Diplomacy.

- The NATO Mediterranean Dialogue

The NATO Mediterranean Dialogue is primarily bilateral in structure (NATO+1) but allows also for multilateral meetings on a regular basis. (NATO+7: Algeria, Egypt, Israel, Jordan, Mauritania, Morocco and Tunisia). The Dialogue consists of a political dialogue combined with participation in specific activities, aimed at exchanging views and information related to the security situation in the Mediterranean region in order to improve regional security and stability. In addition to political meetings, there are regularly organized seminars, workshops and other practical activities in the fields of public information, press activities, and other activities to promote scientific and environmental cooperation.

For example, the Workshop "Desertification in the Mediterranean Region. A Security Issue" organized in Valencia, Spain in December 2003 under the auspices of the NATO Security through Science Programme.

(More information on http://www.nato.int/med-dial/home.htm)

7. Other International Organizations and related Initiatives

Several other initiatives are in place which could benefit from the increased OSCE activities in the Mediterranean region:

- **The UN Convention to Combat Desertification (UNCCD)**

Several Articles of the Convention and two of the Annexes of Regional Application (Annex I for Africa and Annex IV for Northern Mediterranean) are of particular importance for the Mediterranean Region as they call for cooperation between all levels of government, communities, NGOs and land users and international partnership. The objective is to promote sustainable development, better understanding of the value of land resources and scarce water resources, and to ensure sustainable policy planning and decision making through the implementation of national action programmes to combat desertification and land degradation thus contributing to poverty reduction. Action programmes at sub regional and regional level, complement and increase the efficiency of national programmes, particularly in the management of transboundary natural resources. . The UNCCD Secretariat provides assistance to all affected countries, particularly those in Africa, in among others, compiling information and reports required under the Convention. (More information on http://www.unccd.int)

- UNEP / Mediterranean Action Plan (MAP) / "Barcelona Convention"

The Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and its six Protocols constitute the Mediterranean Action Plan's (MAP) Legal Framework which aims at reducing pollution in the Mediterranean Sea and protect and improve the marine environment in the area, thereby contributing to its sustainable development.

- The Euro-Mediterranean Partnership/ Barcelona Process

The Barcelona Process was launched in 1995 and provides a wide framework of political, economic, and social relations between the EU and Partners of the South Mediterranean.

In the framework of the Euro-Mediterranean Partnership, adopted in Barcelona in 1995, the European Union established the 'Short and Medium-Term Priority Environmental Action Programme' (SMAP). This was intended to be the operational tool for the implementation of policy adopted by Euro-Mediterranean partners in the environmental area. It should also provide project financing from the Regional Environment Programme of the MEDA financing instrument.

In addition to the regional component, the EU has concluded bilateral association agreements with most of its partner countries under the framework of the EMP. Through these

agreements, the EU and its partner countries agree to work towards legislative approximation and cooperation in a wide range of sectors, including environment.

- **European Neighbourhood Policy**

In addition to the Barcelona Process, in the framework of the European Neighbourhood Policy (ENP) countries need to prepare **Strategy Papers,** defining the principles, geographical scope, methodology for implementation of the ENP and issues related to regional co-operation. **Country Reports** cover progress in implementation of bilateral agreements and related reforms. (Country Reports of Egypt, Tunisia, Israel, Jordan and Morocco can be downloaded at http://ec.europa.eu/world/enp/documents_en.htm)

The Mediterranean Action Plan's **Blue Plan** initiative is developing environmental performance indicators at national and project level under the supervision of UNEP.

- **Global Water Partnership – Mediterranean**

The Global Water Partnership – Mediterranean (GWP-Med) is a Regional Water Partnership of the Global Water Partnership (GWP). GWP-Med and is a platform bringing together competent organizations working regularly on water issues in the Mediterranean region. GWP-Med's goal is to promote and exchange knowledge on Integrated Water Resource Management (IWRM) for the sustainable use of the region's water resources.

(More information on http://www.gwpmed.org)

- **Bilateral Co-operation: Programa Azahar**

The Azahar Programme is an initiative of the Spanish Agency for International Cooperation aimed at improving human development in the Mediterranean Basin countries, while preserving their natural resources and ensuring proper environmental protection.

The Azahar Programme involves actions concerning land preservation, sustainable water management, renewable energies and the efficient use of energy, sustainable development, sustainable production, and environmental planning and management. The programme relies on the extensive experience and knowledge that Spain can offer in those areas.

OSCE Chairmanship/ NATO Workshop on

"Water Scarcity, Land Degradation and Desertification in the Mediterranean Region - Environment and Security Linkages"

"Museo de las Ciencias Príncipe Felipe"
City of Arts and Sciences
Valencia, Spain
10-11 December 2007

List of participants

ALGERIA

Mr. Mohamed OUZEROUHANE	Desk Officer, in charge of OSCE, Ministry of Foreign Affairs, General Directorate for Europe
Mr. Abdelkader TOUZI	Director, Ministry of Education and Scientific Research, Research Unit for Renewable Energies in Desertic Areas
Mr. Omar BOUGEROUA	Vice Director, Ministry of Water Resources, Exploitation and Hydraulic Management in Agriculture
Mr Menouar HANAFI	Teacher/Researcher, University of Sciencies and Technology of Oran, Department of Chemistry
Mr. Youcef ZENNIR	Counsellor, Ministry of Urban Planing, Environment and Tourism

AUSTRIA

Prof. Winfried E.H. BLUM	University of Natural Resources and Applied Life Sciences (BOKU)

BOSNIA AND HERZEGOVINA

Mr. Mihajlo MARKOVIC	Head of the Institute for the Agroecology and

	Soil Sciences, Faculty of Agriculture, University of Banja Luka, UNCCD Focal Point for Bosnia and Herzegovina

BULGARIA

Ambassador Ivan CHRISTOV	Embassy of Bulgaria to Spain

CZECH REPUBLIC

Mr. Antonin SKOUMAL	First Secretary, Czech Embassy to Spain, Commercial and Economic Section

EGYPT

Prof. Ismail ABD EL-GALIL	Director, Ministry of Agriculture and Land Reclamation, Desert Research Centre
Mr. Yasser Ali RAGAB	Counsellor , Ministry of Foreign Affairs, Office of the Deputy Assistant Minister of Environmental Affairs and Sustainable Development
Dr. Fouad ELSHIBINI	Ministry of Water Resources and Irrigation, National Water Reserach Centre (NWRC)
Dr. Abdel GILIL	UNCCD Focal Point – Egypt
Mr. Mootaz Ahmadein KHALIL	Minister Plenipotentiary, Deputy Head of Mission, Permanent Mission of the Arab Republic of Egypt to the OSCE

ISRAEL

Mr. Simon BERKOWICZ	Scientific Coordinator & Researcher, Hebrew University of Jerusalem - Arid Ecosystems Research Centre (AERC), Institute of Earth Sciences
Dr. Alon RIMMER	Senior Scientist, Israel Oceanographic and Limnological Research – IOLR
Prof. Hillel RUBIN	Chair in Civil Engineering, Harry W. Labov & Charlotte Ullman-LabovTechnion - Israel Institute of Technology, Faculty of Civil & Environmental Engineering
Dr. Uriel SAFRIEL	Hebrew University of Jerusalem, Department of Evolution Systematics and Ecology (ESE), Silberman Institute of Life Sciences
Dr. Shaul SOREK	Researcher , Ben-Gurion University of the

	Negev, the Jacob Blaustein Institutes for Desert Research, Department of Environmental Hydrology & Microbiology, Institute for Water Sciences and Technology

ITALIA

Dr. Luigi NOCERA	Counsellor, Regione Campania
Dr. Antonio BUONO	Regione Campania
Dr. Raffaella ZUCARO	Expert, Ministry of Agriculture
Dr. Antonella PONTRANDOLFI	Researcher , National Institute of Agricultural Economics

JORDAN

Mr. Abdallah AL-NAIMAT	Director, Ministry of Agriculture, Department of Land and Irrigation

MAURITANIE

Mr Moustapha OULD MOHAMED	Coordinator of the project CUN, Ministry of Environment
Mr Ethmane OULD BOUBACAR	Chef Service, Ministry of Environment

MORROCCO

Mr. Mohamed BADRAOUI	Director, High Commissariat of Water, Forest and Combating Desertification in the Mediterranean Region, Departement for the Fight against Desertification and Protection of Nature
Mr. Es-Said MAKKAK	Chief of Service, High Commissariat of Water, Forest and Combating Desertification in the Mediterranean Region, Regional Service for Waters and Forest of Ouarzazate

PORTUGAL

Mr. Paulo RUFINO	OSCE Coordinator, Ministry of Foreign Affairs

RUSSIAN FEDERATION

Mr. Valery OKNYANSKIY	Head of Division, Ministry of Foreign Affairs, Department of Economic Co-operation
Mr. Vasily ZOLOTUKHIN	Counsellor, Ministry of Foreign Affairs, Department of Economic Cooperation

Dr. Andrey SHMAKIN	Head of Laboratory of Climatology, Institute of Geography, Russian Academy of Sciences
	SERBIA
Ms. Snezana KUZMANOVIC	Head of Soil Unit, Ministry of Foreign Affairs, Department for Integrated Monitoring and Control of Environmental Pollution, Soil Unit
	SLOVENIA
Mr. Jernej CIMPERSEK	Deputy Head of Mission, Counsellor, Permanent Mission of Slovenia to the OSCE
	SPAIN
Dr. Vicente ANDREU-PEREZ	Official Researcher, CSIC (National Research Council of Spain), Center of Research on Desertification–CIDE, Department of land Degradation and Conservation
Mr. Javier FERRER POLO	Head of Water Planning Unit Jucar River Basin Authority Vice-President of the Mediterranean Network of Basin Organisations, Vice-President of the Hydrographic Confederation of the Júcar River
Dr. Eugenia Gimeno-García	Contract Researcher, CSIC (National Research Council of Spain), Center of Research on Desertification–CIDE, Department of land Degradation and Conservation
Mr. Isidro GONZALEZ	Councellor, Spanish OSCE Chairmanshi , CiO
Ms. Katharina KOBER	Project Co-ordinator of the Mediterranean Network of Basin Organizations (MENBO), REMOC Permanent Technical Secretariat
Amb. Jose Angel LOPEZ-JORRIN	Head of the Task Force., Spanish OSCE Chairmanship , CiO
Mr. Jesús LOPEZ-MEDEL	Congress of Deputies
Dr. Juan A. PASCUAL	Contract Researcher, CSIC (National Research Council of Spain), Center of Research on Desertification–CIDE, Department of land Degradation and Conservation
Mr. Leopoldo ROJO SERRANO	Ministry of Environment, Directorate General of Biodiversity
Mr. Jaime ROMERO	Councellor, Spanish OSCE Chairmanship , CiO
Dr. José L. RUBIO	Official Researcher, CSIC (National Research Council of Spain), Center of Research on

	Desertification–CIDE, Department of land Degradation and Conservation
Ms. Maria SERNEGUET	Programme Officer of the Mediterranean Network of Basin Organizations (MENBO), Secretaría Técnica Permanente de la REMOC
Dr. Alberto GARCIA-PRATS	Professor, Politechnic University of Valencia, Department of Hidraulic Engineering and Environment
Dr. Antonio D. DEL CAMPO	Lecturer/Researcher, Politechnic University of Valencia, ETSIA, Department of Hidraulic Engineering and Environment
Ms. Amparo Taroncher	Student
	TUNISIA
Mr. Mohamed Mehdi MLIKA	Advisory Minister for Prime Minister, Mediterranean Network Association for the Sustainable Development (AREMEDD)
Ms. Amina LAZOUGHLI	Advisor of the Ministry of Foreign Affairs, Ministry of Foreign Affairs
Mr. Ameur HAMROUNI	Member of the Bureau, Mediterranean Network Association for the Sustainable Development (AREMEDD), CITET
	TURKEY
Dr. Ayse BULUR	Agricultural Engineer, General Directorate of Hydraulic Works
rkeyMr. Yalcin BAGSIZ	Director of Section, Ministry of Agriculture and Rural Affairs, DG.Protection and Control
	UKRAINE
Mr. Yuriy OLEXIENKO	First Deputy Head, State Agency for Land Resources
	USA
Mr. William KEPNER	Research Ecologist, Office of Research and Development, US Environmental Protection Agency-EPA
Dr. David MOUAT	Desert Research Institute, Division of Earth and Ecosystem Sciences
	NATO
Dr. Fausto PEDRAZZINI	Programme Director, Science for Peace and

	Security Programme, NATO Public Diplomacy Division

UN

Dr. Tamer AFIFI	UN University , Institute for Environment and Human Security

UNCCD

Mr. Gregoire DE KALBERMATTEN	Deputy Executive Secretary, UNCCD Secretariat
Mr. Boubacar CISSE	Coordinator , UNCCD Secretariat, Africa Unit

UNEP

Dr. Otto SIMONETT	Programme Director, UNEP GRID-Arendal
Mr. Henri-Luc THIBAULT	Director, Blue Plan

OSCE PARLIAMENTARY ASSEMBLY

Mr. Gustavo PALLARES	Counsellor, OSCE Parliamentary Assembly, OSCE PA Secretariat

OSCE SECRETARIAT

Mr. Bernard SNOY	Co-ordinator of OSCE Economic and Environmental Activitities, OSCE Secretariat
Mr. Marc BALTES	Senior Economic Adviser, Office of the Co-ordinator of OSCE Economic and Environmental Activitites
Mr. Gabriel LEONTE	Economic and Environmental Adviser, Office of the Co-ordinator of OSCE Economic and Environmental Activitites
Mr. Raul DAUSSA	Environmental Programme Officer, Office of the Co-ordinator of OSCE Economic and Environmental Activitites
Ms. Araceli JIMENEZ SEGURA	Liaison Officer, Office of the Co-ordinator of OSCE Economic and Environmental Activitites
Mr. Philip REUCHLIN	Economic and Environmental Adviser, Office of the Co-ordinator of OSCE Economic and Environmental Activitites