Biodiversity in the Desert Areas: Present Status, Threats & Remediation

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Alarming Prospect of Biodiversity in Afghanistan's Desert Areas

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Natural disasters coupled with the consequences of conflict on Afghanistan's natural resources base has put a heavy toll on the environment and ecosystem in the country. The decades of conflict, present instability, general poverty, droughts, population growth and influx of displaced and returning refugees have had a severe impact on the biodiversity of Afghanistan.

The country is home to globally significant wildlife species most of which are under severe pressure from excessive hunting, loss of habitat and illegal trade. Endangered species of plants and animals are found in all parts of the country's ecosystem. A large portion of Afghanistan's territory is arid and non-arable.

The alarming loss of biodiversity in Afghanistan's arid deserts of the southwest, if not properly addressed, will continue to reduce nature's ability to support life in these areas.

Sustainability of the country's scarce resources are subject to a variety of threats. These threats include but are not limited to the impact of global climate change , lack of data , insufficient human resource and institutional capacity, widespread poverty and on – going social and political instability.

While the threats are huge and the prospects of Afghanistan biodiversity is alarming, what has been achieved during the last couple of years make us believe that we can optimistically build upon these achievements and further focus on remediation measures.

Afghanistan established its National Environment Protection Agency in 2005. Subsequently, the country's first environment

law was announced, which was promulgated in 2007. NEPA establish the first protected species list which includes 33 threatened species in the country. NEPA announced Afghanistan's 4-year national biodiversity strategy in 2012 and launched its implementation. Bande Amir was officially declared as Afghanistan's first National Park in 1973.

This was a critical step towards conservation of biodiversity in Afghanistan's protected areas at Bande Amir and five other wildlife reserves and sanctuaries established in the 1970, that were abandoned during the 30 years of war.

To conserve biodiversity in Afghanistan's desert areas, first of all there is need for better understanding of the country's natural resources, in general, with focus on protected areas and deserts that are home to globally significant species, in particular financial resources are required for conducting biodiversity assessments, developing management plants and undertaking adaptation and mitigation measures to balance the effect of climate change.

Due to poverty, local communities located within nature reserve zones and surrounding protected areas are highly dependent of natural resources to sustain their livelihood.

Therefore, it is critical that local communities are empowered and their socioeconomic stability promoted so that they extend their support for sustainable conservation and management of wildlife and natural environment.

A poverty reduction strategy that provides skills training and capacity building at the individual and institutional level , alternative livelihoods, food security , and access to health and education facilities and services is an essential part of a strategic approach to involve local communities in the management of protected areas as part of a national biodiversity conservation program.

Pilot programs need to be developed and implemented that if successful be considered for broader application nationwide.

Alarming Prospects of Biodiversity in Afghanistan's Desert Areas

Afghanistan is a country rich in living resources and natural beauty. Natural resources and associated biological diversity provides the livelihood basis for up to 80% of the Afghan population. However, natural disasters coupled with the consequences of conflict on Afghanistan's natural resources base have put a heavy toll on the environment and ecosystem in the country.

The decades of conflict, present instability, general poverty, immediate needs, drought, population growth, low level of education, and influx of displaced and returning refugees have had a severe impact on the biodiversity of Afghanistan. The potentially far-reaching impacts of biodiversity loss and natural resource degradation for the Afghan people led the Government of the Islamic Republic of Afghanistan to sign and ratify the United Nations Convention on Biological Diversity (UNCBD) in 1992.

Although, little significant information has been gathered since the onset of war in 1978 and most of the information on Afghanistan's biodiversity is outdated. However, the few recent investigations suggest that Afghanistan's biodiversity has suffered enormously in the last three decades. A recent classification breaks Afghanistan down into 15 smaller eco-regions of which four are considered as critical/ endangered, eight as vulnerable and only two as relatively stable and intact.

I would like to highlight that the country is home to globally significant wildlife species most of which are under severe pressure from excessive hunting, loss of habitat, and illegal trade. There are 137-150 species of mammalian, 428-550 types of birds, around 100 reptiles, 245 butterflies, 3500 - 4000 types of plants, and a variety of creepers, amphibians, and the fish are found in the country. The range in numbers is due to

uncertainty in taxonomy and validity of some records.

Endangered species of plants and animals are found in all parts of the country's ecosystem. The Afghanistan National Environment Protection Agency (NEPA) established the first protected species list that includes 33 threatened and endangered species. This was the first list of a series that will continue to be completed over the next few years. A total of 39 species and eight subspecies appear on the World Conservation Union (IUCN) Red List as being globally threatened with extinction.

Afghanistan has a complex geographic structure that provides home to a variety of wildlife species. A large portion of Afghanistan's territory is arid and non-arable. For example, Afghanistan's arid deserts of the southwest including seven deserts of Herat Province are experiencing alarming loss of biodiversity.

The alarming loss of biodiversity in Afghanistan's arid deserts of the southwest (Registan), if not properly addressed, will continue to reduce nature's ability to support life in these areas. Specifically two main areas of concern are grazing grasses and wildlife – both of which are severely damaged. Herat was enjoying a variety of wildlife species; regrettably during the recent couple of years the number of species is reduced and a number of them are no longer seen. Forests of Khenjak pistachio and wild almond of Herat are in danger of total devastation. Also, the variety of grass plants is damaged in most grazing areas of the province. As the number of beneficial grazing grasses is getting reduced, instead non-useful grasses are increasing in grazing fields.

Sustainability of the country's scarce resources is subject to a variety of threats. These threats include but are not limited to the impact of global climate change, lack of data, insufficient human resource and institutional capacity, widespread poverty

and ongoing social and political instability. However, a major cause for the loss of biodiversity in Afghanistan is instability because, instability causes ecosystem to be more vulnerable to extreme conditions resulting from climate change.

While the threats are huge and the prospects of Afghanistan biodiversity is alarming, what has been achieved during the last couple of years make us believe that we can optimistically build upon these achievements and further focus on remediation measures.

It is saddening to see the degradation of Afghanistan's biological diversity, to the detriment of our country's sustainable development. Drought and mismanagement of our precious water resources are affecting agricultural productivity and the health of our families, desertification is reducing the carrying capacity of our land, and the unsustainable harvesting of our precious forest resources marks the loss of a national treasure. It is in this context that the Government of the Islamic Republic of Afghanistan has paid considerable attention to environmental issues in recent years.

Afghanistan established its National Environment Protection Agency (NEPA) in 2005. Subsequently, the country's first environment law was announced, which was promulgated in 2007. The Forest Law, Rangeland Law, Land Policy and protected area regulations have all been drafted and are currently being reviewed by the Afghan Government. There are multiple community based natural resource management initiatives being supported by the Government and the International Community around the country.

NEPA announced Afghanistan's 4-year national biodiversity strategy in 2012 and launched its implementation. Bande Amir was officially declared as the Afghanistan's first National Park. This was a critical step towards conservation of biodiversity in

Afghanistan's protected areas at Bande Amir and five other wildlife reserves and sanctuaries established in the 1970 that were abandoned during the 30 years of war.

The primary value of biodiversity to Afghans lies in the tangible goods and services that biodiversity provides to Afghans. The most obvious of these are the direct uses of the components of biodiversity from traditional crops, fruits, grazing, fuel, timber harvesting, fishing, and hunting. Less obvious are the "ecosystem services" provided by biodiversity. These include soil fertility, erosion control, crop pollination, and climatic stability, to name a few. The ecosystem services provided by biodiversity are rarely understood and usually taken for granted, but as Diamond (2005) has argued, loss of these ecosystem services has often contributed in a central way to the decline and ultimate collapse of societies.

Biodiversity has been termed "the wealth of the poor" (World Resources Institute 2005) because the poor tend to be rural people living close to the land and dependent on it for the goods and services provided by biodiversity, e.g. productive crop and grazing land, fuel, building materials, wild fish and game. Land rich in biodiversity is a form of wealth, even if that wealth cannot be measured in strictly monetary terms. The converse is that a country that has eliminated its biodiversity is a country condemned to remain poor. Without the basic goods and services provided by biodiversity it is not possible for rural people to make a living from the land. Poverty and emigration are the only options.

To conserve biodiversity in Afghanistan's desert areas, first of all there is need for better understanding of the country's natural resources, in general, with focus on protected areas and deserts that are home to globally significant species, in particular. Financial resources are required for conducting biodiversity assessments, developing management plans and undertaking adaptation and mitigation measures to balance

the effect of climate change. However, only limited resources are available to address these challenges.

Afghans recognize the importance of biodiversity conservation and support it through our values, performance, and all our means including communication and engagement. However, due to poverty, local communities located within nature reserve zones and surrounding protected areas are highly dependent on natural resources to sustain their livelihood. Therefore, it is critical that local communities are empowered and their socioeconomic stability promoted so that they extend their support for sustainable conservation and management of wildlife and natural environment. They need to be provided with alternate sources of livelihood.

A poverty reduction strategy that provides skills training and capacity building at the individual and institutional level, alternative livelihoods, food security, and access to health and education facilities and services is an essential part of a strategic approach to involve local communities in the management of protected areas as part of a national biodiversity conservation program. In the meantime, pilot programs need to be developed and implemented that, if successful, could be considered for broader application nationwide.

The current state of Afghanistan's biodiversity suggests a number of specific actions that should be instituted in the near future to protect known biodiversity priorities and to fill key knowledge gaps. Detailed actions must be undertaken within the context of broader institutional initiatives to conserve biodiversity including:

1. Improving the capacity of government institutions to effectively manage biodiversity.
2. Increasing public awareness of biodiversity and its value to the Afghan people.

3. Supporting implementation of the National Biodiversity Strategy that has been recently announced by the Afghan Government.

Government of the Islamic Republic of Afghanistan with the help of international community has been able to address some of the challenges faced by biodiversity in the country, but instability as a major cause for the loss of biodiversity in Afghanistan is yet to be addressed. It is with regret to say that while Afghanistan's biodiversity has been suffering from continued instability in the country, the situation seems likely to be further deteriorated by withdrawal of ISAF forces in 2014 and transition of security to Afghans.

Therefore; as an official of the Government of the Islamic Republic of Afghanistan, I urge you all to take note of Afghanistan's rich biological diversity, recognize the serious threats that face this important resource, and help us ensure that this rich natural heritage is not lost.

Thanks,

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Dynamic Conservation of Globally Important Agricultural Heritage Systems: For A Sustainable Agriculture And Rural Development

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The story of world agriculture is closely interwoven with that of the evolution of human civilization and of its diverse cultures and communities across the globe. In many developing countries, agricultural and rural life to this day is considerably influenced by the society's ancient cultural traditions and local community institutions and values, which are mostly conditioned by natural endowments, wealth and breadth of accumulated knowledge and experience in the management and use of natural resources. The Globally Important Agricultural Heritage Systems are dispersed over many countries and regions, and represent a microcosm of the larger rural world of land-use systems, livestock, pastures, grasslands, forestry and fisheries. They reflect the value of the diversity of agricultural systems adapted to different environments and tell a fascinating story of man's ability and cultural ingenuity to adjust and adapt to the vagaries of a changing physical and material environment, from generation to generation and leave indelible imprints of an abiding commitment to nature conservation and respect for their agricultural patrimony. These agricultural heritage systems have a contemporary relevance, among others, for providing sustainable diets for the rural poor, food sovereignty, livelihood security and sustainable development.

1. Introduction

Throughout centuries, human communities, generations of farmers, herders and forest people have developed complex,

diverse and locally adapted agricultural and forestry systems. These systems have been managed with time-tested ingenious combinations of techniques and practices that have usually led to community food security and the conservation of natural resources and biodiversity. These microcosms of agricultural heritage can still be found throughout the world covering about 5 million ha which provide a series of cultural and ecological services to humankind such as the preservation of traditional forms of knowledge systems, traditional crops and animal varieties and autochthonous forms of sociocultural organizations. These agricultural heritage systems have resulted not only in outstanding landscapes of aesthetic beauty, maintenance of globally significant agricultural biodiversity, resilient ecosystems and valuable cultural inheritance, but above all, in the sustained provision of multiple goods and services, food and livelihood security for millions of poor and small farmers. Their agricultural biodiversity is maintained and dynamically conserved by rural farming communities through localized, traditional ecological agricultural practices/knowledge systems. However, many of these globally important biological diversity and ecological friendly agricultural systems and their goods and services are threatened by several factors such as lack of or low priorities for family farming systems, lack of access to market, displacement of local agricultural practices, lack of social organization and financial-institutional support that underpin management of these systems. Thus, the desired progress towards a sustained economic development process is compromised and thereby resulting in disparities between and among communities.

2. What are GIAHS?

The Food and Agriculture Organization (FAO) of the United Nations defines Globally Important Agricultural Heritage Systems (GIAHS) as "remarkable land use systems and landscapes which are rich in globally significant biological diversity evolving from the co-adaptation of a community with

its environment and its needs and aspirations for sustainable development" (FAO, 2002). GIAHS are classified and typified based on its ingenuity of management systems, high levels of agricultural biodiversity and associated biodiversity, local food security, biophysical, economic and sociocultural resources that have evolved under specific ecological and sociocultural constraints and opportunities. The examples of such agricultural heritage systems are in the hundreds and are home to thousands of ethnic groups, indigenous communities and local populations with a myriad of cultures, languages and social organizations (Koohafkan and Altieri, 2010).

Examples of GIAHS could fall into:

I. Mountain rice terrace agro-ecosystems. These are outstanding mountain rice terrace systems with integrated forest use and/or combined agroforestry systems

II. Multiple cropping/polyculture farming systems. These are remarkable combinations and/or plantings of numerous crop varieties with or without integration of agroforestry. They are characterized by ingenious microclimate regulation, soil and water management schemes, and adaptive use of crops to deal with climate variability.

III. Understory farming systems. These are agricultural systems using combined or integrated forestry, orchard or other crop systems with both overstory canopy and understory environments. Farmers use understory crops to provide earlier returns, diversify crops/products and/or make efficient use of land and labour.

IV. Nomadic and semi-nomadic pastoral systems. These are the rangeland/pastoral systems based on adaptive use of pasture, rangeland, water, salt and forest resources, through mobility and variations in herd composition in harsh non-equilibrium environments with high animal genetic diversity

and outstanding cultural landscapes.

V. Ancient irrigation, soil and water management systems. These are the ingenious and finely tuned irrigation, soil and water management systems most common in drylands, with a high diversity of crops and animals best adapted to such environments.

VI. Complex multilayered home gardens. These agricultural systems feature complex multilayered home gardens with wild and domesticated trees, shrubs and plants for multiple foods, medicines, ornamentals and other materials, possibly with integrated agroforestry, swidden fields, hunting gathering or livestock, and home garden systems.

VII. Below sea level systems. These agricultural systems feature soil and water management techniques for creating arable land through draining delta swamps. The systems function in a context of rising sea and river levels while continuously raising land levels, thereby providing a multifunctional use of land (for agriculture, recreation and tourism, nature conservation, culture conservation and urbanization).

VIII. Tribal agricultural heritage systems. These systems feature various tribal agricultural practices and techniques of managing soil, water and crop cultivars in sloping lands from upper to lower valleys using mixed and/or a combination of cropping systems and integrating indigenous knowledge systems.

IX. High-value crop and spice systems. These systems feature management practices of ancient fields and high-value crops and spices, devoted uniquely to specific crops or with crop rotation techniques and harvesting techniques that require acquired handling skills and extraordinary finesse.

X. Hunting-gathering systems. These systems feature unique agricultural practices such as harvesting of wild rice, honey gathering in the forest, and other similar unique practices.

3. Dynamic conservation of agricultural heritage systems

In the past decades, conventional agricultural policies have assimilated the food security and agricultural development largely through increased food production by energy-intensive modern agriculture, which is a fossil fuel based industry and its development is tightly linked to energy factors, trade and globalization. While the successes in agriculture production over the last decades are viewed as a major landmark, the inequitable benefits and negative impacts of such policies on natural resources are becoming more evident. Undoubtedly, the acceleration of environmental degradation and climate change also has had adverse impacts on agricultural productivity and food security. Such an adverse impact on agricultural productivity is more and more becoming obvious in the more fragile tropical environmental situations of the developing world. The environmental degradation and linked declining crop productivity that the two large Asian countries, namely, India and China are facing today and the emerging concerns for sustainable agriculture (Ramakrishnan, 2008 unpublished) are indicative of the emerging global food security concerns, and equitable distribution of what is available so that all sections of the society are able to benefit. This is the context in which the still existing traditional agricultural systems conserved by many traditional farming societies (those living close to nature and natural resources) largely confined to the developing tropics have an important role to play. Rather than being seen as an industrial activity as modern agriculture tends to be, traditional agricultural systems are organized and managed through highly adapted social and cultural practices and institutions wherein the concerns are for food security linked with equitable sharing of what is available. Equity is ensured through locally relevant technologies that are

cheap since they are based on effective utilization of the continually evolving traditional wisdom linked with locally available natural resources and their effective management that is community participatory.

Indeed, traditional agricultural and ecological knowledge and the derived traditional technologies that societies have developed through an experiential process form the basis for addressing productivity consideration with equitability concerns in mind. In this process they manipulate natural and human-managed biodiversity in a variety of different ways towards sustainable production with concerns also for coping with the environmental uncertainties that they have to face from time to time. FAO's GIAHS initiative is seeking to identify outstanding traditional agricultural systems and support their dynamic conservation as well as sustainable evolution. GIAHS can be viewed as benchmark systems for international and national strategies for sustainable agricultural development and addressing the rising demand to meet food and livelihood needs of poor and remote populations.

Dynamic conservation implies what the traditional farmers have always practised, namely, adaptive management of their systems under changing environmental considerations, both in time and space. GIAHS have always faced many challenges in adapting to rapid environmental and socio-economic changes in the context of weak agricultural and environmental policies, climate variability and fluctuating economic and cultural pressures (Altieri and Koohafkan, 2008). There is no doubt, these threats vary from one country to another, but there are common denominators that are rapidly emerging in the global scene:

(a) "global change" in an ecological sense, involving land use land cover changes, biodiversity depletion, biological invasion and of course the emerging climate change and linked global warming; and

(b) economic "globalization" that would accentuate the

problem of landscape homogenization arising from the implication that globalization implies, namely, intensive management of vast areas of the land through monocropping practices.

These global threats emphasize the need to ensure dynamic conservation of selected systems which could then form the basis for conserving both agricultural and linked natural biodiversity, at the same time using such systems as learning grounds towards addressing the diverse viewpoints of "sustainable agriculture". Once lost, the unique agricultural legacy and the associated eco-agricultural heritage will also be lost forever. Hence, there is a need to carefully identify agricultural heritage systems wherever they exist, with a view to dynamically conserve them and thereby promote the basic goods and services humanity needs today and for the future generations.

The GIAHS initiative is conceived as being inclusive and forward looking with agricultural patrimony serving as models for agricultural development in similar environments, i.e. uplands, drylands, wetlands management etc. based on the experience and learning from the pilot projects.

The GIAHS initiative is not just a collection of local projects; it has a global focus within the framework of policies promoting local food security through sustainable systems. Thus, GIAHS, while starting initially on some pilot countries in the developing and developing world, is looking forward to expand with a more inclusive international coverage and recognition of such evolving, living agricultural systems as an important global initiative to promote sustainable development, enhance food security and promote conservation of biodiversity of nutritional importance for the local communities. Figure 1 shows the unique features and principles of GIAHS derived from such sites that may be replicated in other farming systems to achieve sustainability and resiliency.

4. GIAHS pilot systems around the world

The GIAHS initiative has selected pilot systems located in several countries of the developing world. The values of such systems not only reside in the fact that they offer outstanding aesthetic beauty, are key in the maintenance of globally significant agricultural biodiversity, and include resilient ecosystems that harbour valuable cultural inheritance, but also have sustainably provisioned multiple goods and services,

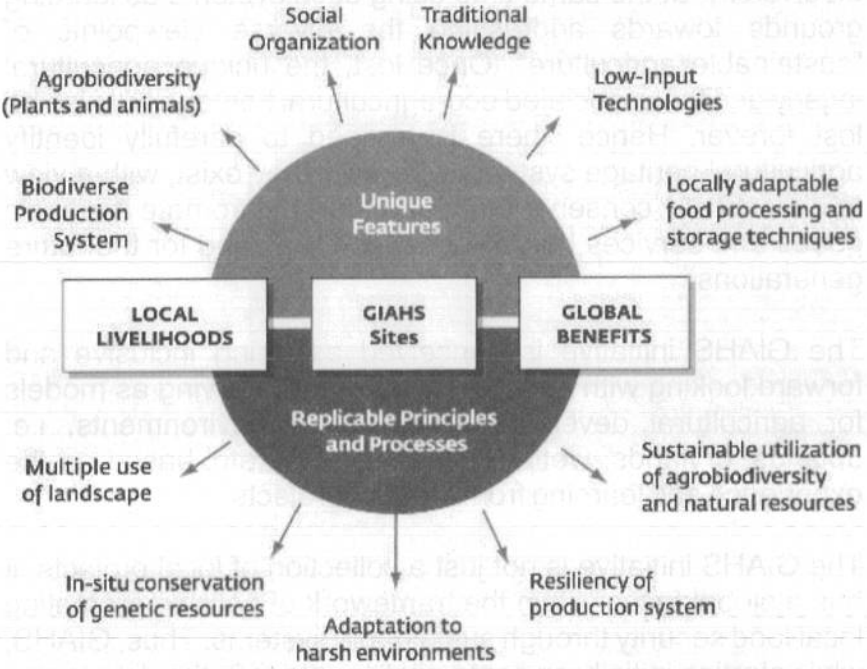

Figure 1. The unique features and principles of GIAHS sites that may be replicated in other farming systems to achieve sustainability and resiliency.

food and livelihood security for millions of poor and small farmers, local community members and indigenous peoples, well beyond their borders. Despite the fact that in most parts of the world, modernity has been characterized by a process of cultural and economic homogenization, in many rural areas specific cultural groups remain linked to a given geographical and social context in which particular forms of traditional

agriculture and gastronomic traditions thrive. It is precisely this persistence that makes for the selection of these areas and their rural communities a GIAHS site. The dynamic conservation of such sites and their cultural identity is the basis of a strategy for territorial development and sociocultural revival. Overcoming poverty, food insecurity is not equivalent to resignation to loss of the cultural richness of rural communities.

On the contrary, the foundation of regional development should be the existing natural and agricultural biodiversity and the sociocultural context that nurtures it. Brief descriptions of some of the pilot Agricultural Heritage Systems and their features are presented in Table 1.

Table 1. List of pilot systems for dynamic conservation of Globally Important Agricultural Heritage Systems.

Country/Systems	Main characteristics and important source of food security and nutrition diets
Chile/Chiloé Agriculture System	The Archipelago of Chiloé, a group of islands in southern Chile, is a land rich in mythology with native forms of agriculture practised for hundreds of years based on the cultivation of numerous local varieties of potatoes. Traditionally the indigenous communities and farmers of Chiloé cultivated about 800–1 000 native varieties of potatoes. The varieties that still exist at present are the result of a long domestication through selection and conservation processes of ancient Chilotes.
Peru/Andean Agriculture System (The Cuzco-Puno Corridor)	Andean people have domesticated a suite of crops and animals. Of particular importance are the numerous tubers, of which the potato is the most prominent. Generations of Aymara and Quechua have domesticated several hundred varieties in the valleys of Cusco and Puno, of which more than 400 varieties are still grown today. The maintenance of this wide genetic base is adaptive since it reduces the threat of crop loss due to pests and pathogens specific to

	particular strains of the crop. Other tubers grown include oca, mashua, ullucu, arracacha, maca, achira and yacón.
Philippines/Ifugao Rice Terraces	Philippines/Ifugao Rice TerracesThe ancient Ifugao Rice Terraces (IRT) are the country's only highland mountain rice ecosystem (about 68 000 ha) featuring the Ifugao ingenuities, which has created a remarkable agricultural organic paddy farming system that has retained its viability over 2 000 years. IRT paddy farming favours planting traditional rice varieties of high quality for food and rice wine production
China/Rice-Fish Culture (Qingtian County)	In Asia fish farming in wet rice fields has a long history. Over time an ecological symbiosis has emerged in these traditional rice-fish agricultural systems. Fish provide fertilizer to rice, regulate microclimatic conditions, soften the soil, displace water and eat larvae and weeds in the flooded fields; rice provides shade and food for fish. Furthermore, multiple products and ecological services from the rice ecosystems benefit local farmers and the environment. Fish and rice provide high quality nutrients and an enhanced living standard for farmers.
China/Hani Rice Terraces	Hani Rice Terraces are located in the southeast part of the Yunnan Province. Hani Rice Terraces are rich in agricultural biodiversity and associated biodiversity. Of the original 195 local rice varieties, today there are still about 48 varieties. To conserve rice diversity, Hani people are exchanging seed varieties with surrounding villages
China/Wannian Traditional Rice Culture	Wannian traditional rice was formerly called "Wuyuanzao" and is now commonly known as "Manggu", cultivated in Heqiao Village since the North and South Dynasty. Wannian varieties are unique traditional rice varieties as they only thrive in Heqiao Village. This traditional rice is of high nutritional value as it contains more protein than ordinary hybrid rice and is rich in micronutrients and vitamins. Rice culture is intimately related to local people's daily life, expressed in the cultural diversity of their customs, food and language.

Tunisia/Gafsa Oases	The Gafsa Oases in Tunisia covers an area approximately 36 000 ha. It has numerous production systems, which are very diverse, unique, intensively cultivated but very productive. These agro-ecological production systems allow conservation and maintenance of biological diversity of local and global significance. Over a thousand years, the hundreds of palm and fruit tree varieties, vegetables and forage crops have provided the food systems and food requirements of the communities living in and around the Tunisian oases and of the populations of the Maghreb Region.
Morocco/Oases in the High Atlas Mountains	In this mountain oasis, they developed their own ingenious and practical solutions for managing natural resources which are still in place today. Their reliance on local biodiversity for subsistence and health (aromatic and medicinal plant species) has promoted the conservation and maintenance of diverse plant genetic resources, in a complex and stratified landscape in the green pockets of the oases and through associated knowledge and practices.
Tanzania/Shimbwe Juu Kihamba Agroforestry	The Chagga tribe on Mt. Kilimanjaro had created a multitier agroforestry system some 800 years ago. It is locally known as Kihamba and covers some 120 000 ha. This agroforestry system had provided food security and livelihoods for the highest population densities known in Africa without compromising sustainability. During colonial times coffee was adopted by farmers which allowed its adaptation to a more cash crop oriented society. The Kihamba cultivate combined perennial (indigenous trees with vines, banana, coffee, shrubs) and annual
Kenya/Maasai Pastoral System	For more than a thousand years, the Maasai in southern Kenya and northern Tanzania have developed and maintained a highly flexible and sustainable mobile livestock-keeping system, moving herds and people in harmony with nature's patterns. Their customary institutions for collectively managing livestock, pastures, water, forest and other natural resources, combined

	with vast traditional knowledge and strong cultural traditions, treating nature with respect.
Algeria/El Oued, Souf Ghout System	In an arid region such as El Oued, where rainfall is almost absent, the groundwater reserves provide essential support to all human life, animal and plant. To overcome the lack of surface water, the farmers irrigate their palms plantation by groundwater. The method of irrigating groves of El Oued is quite original: it is to get the roots of the palm into the groundwater and will be continuously in contact with water. The population cultivates their palms in the crater called Ghout, to reduce the depth between the ground and the roots of the palm.
Japan/Sado Island	Sado is characterized by a variety of landforms and altitudes, which have been ingeniously harnessed to create the satoyama landscape, a dynamic mosaic of various socio-ecological systems comprising secondary woodlands, plantations, grasslands, paddy fields, wetlands, irrigation ponds and canals. Within their complex ecosystem, the satoyama and the satoumi landscapes in Sado Island harbour a variety of agricultural biodiversity, such as rice, beans, vegetables, potatoes, soba, fruit, grown in paddy fields and other fields, livestock, wild plants and mushrooms in forests, and seafood in the coastal areas. Rice, beef and persimmon from the Sado are among the best in Japan.
Japan/Noto Peninsula	The peninsula is a microcosm of traditional rural Japan where agricultural systems are integrally linked to mountains and forest activities upstream and coastal marine activities downstream. Holistic approaches to integrated human activities of fishing, farming and forestry have traditionally been practised and continue to co-exist. Hilly terrain interspersed with wide valleys and fields forming a green corridor surrounded by volcanic rock coastline typify the peninsular landscape. Noto Peninsula has been gaining recognition both locally and regionally for its traditional vegetables and rice varieties. Over

	20 varieties of indigenous aburana (rape varieties of cruciferous vegetables) families grow and are consumed by a majority of satoyama satoumi households in the peninsula.

(For more details, please refer to www.fao.org/nr/giahs)

5. Examples of dynamic conservation: The case of the rice-fish culture in China

For more than 5 years of implementation, the GIAHS site in China has started Longxian village, a rice-fish culture system. Fish provide nutrition and fertilizer to rice, regulate microclimatic conditions and eat larvae and weeds in the flooded fields, reducing the cost of labour needed for fertilizer and insect control. The rice-fish culture self-sufficiency production provides favourable eco-environmental conditions that are also beneficial to conservation of other crop species for home gardens of importance to local food nutrition and diets, i.e. lotus roots, beans, taro, eggplant, Chinese plums, mulberry and forest tree species of ethnobotanical and medicinal uses. However, population emigration and modern technologies to intensify production are threatening the rice-fish culture system in the village. Through the GIAHS initiative, rice-fish practices in China have made a comeback and given hope to small farmers. FAO assisted the national and local institutions to develop and implement an action plan and a supportive institutional framework. The local government of Qingtian has internalized the GIAHS concept and has taken steps forward to promote the conservation of their agricultural heritage. They have issued a temporary legislation to promote rice-fish conservation and development in 2010. The Qingtian Bureau of Agriculture, Environmental Protection, Culture and Tourism has also made great effort to support and encourage local farmers to join the conservation programme. Since then, Longxian village has become popular among tourists (local and foreign) and the number of visitors has increased more than threefold. GIAHS have created awareness of conservation in Longxian village in China, because it has

helped stakeholders become aware that multiple goods and services exist in traditional agricultural systems. The system provides economic and nutritional values (healthy food, nutritious rice and fish products), social values (labour occupation), ecological (rich agricultural biodiversity, clean and healthy farms and environment), and cultural and ecotourism values for humanity. Dynamic conservation of GIAHS has offered many opportunities for socio-economic and research development, such as: rice-fish system for research and education, fish and rice delicacies, aesthetic landscape, old mountain village, and folk-custom culture.

6. Summary and way forward for sustainable agriculture and rural development

Globally Important Agricultural Heritage Systems are living, evolving systems of human communities in an intricate relationship with their territory, cultural or agricultural landscapes or biophysical and wider social environment. The humans and their way of life have continually adapted to the potentials and constraints of the social-ecological environments, and shaped the landscapes into remarkable and aesthetic beauty, accumulated wealth of knowledge systems and culture, local food systems and diets, and in the perpetuation of the biological diversity of global significance. Many GIAHS and their unique elements are under threats and facing disappearance due to the penetration of global commodity driven markets that often create situations in which local producers or communities in GIAHS have to compete with agricultural produce from intensive and often subsidized agriculture in other areas of the world. All of these threats and issues pose the risk of loss of unique and globally significant agricultural biodiversity and associated knowledge, aesthetic beauty, human culture, and thereby threatening the livelihood security and food sovereignty of many rural, traditional and family farming communities. Moreover, what is not being realized is that, once these GIAHS unique key elements are lost, the agricultural legacy and associated social-ecological

and cultural, local and global benefits will also be lost forever. Therefore, policies are needed to support dynamic conservation of agricultural heritage and safeguard it from the negative external drivers of change. It is likewise important to protect the natural and cultural assets of GIAHS sites from industrial development, which often extract labour and cause market distortion as well. Special attention should be given when introducing modern agricultural varieties and inputs to avoid upsetting the balance of traditional agro-ecosystems.

Success in sustainable agriculture development will depend on the use of a variety of agro-ecological improvements in addition to farm diversification, favouring better use of local resources; emphasizing human capital enhancement; empowerment of rural communities and family farmers through training and participatory methods; as well as higher access to equitable markets, credit and income-generating activities, and all should be supported by conducive policies.

References

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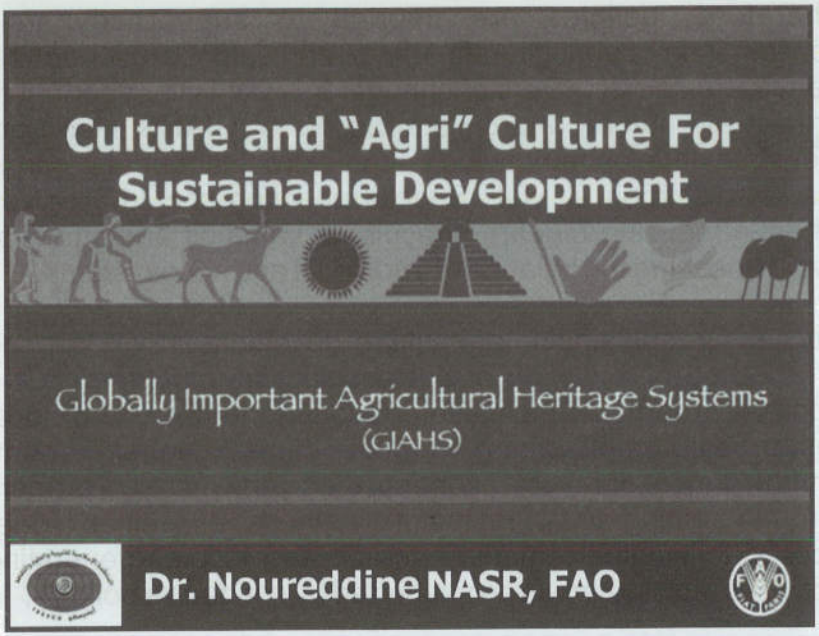
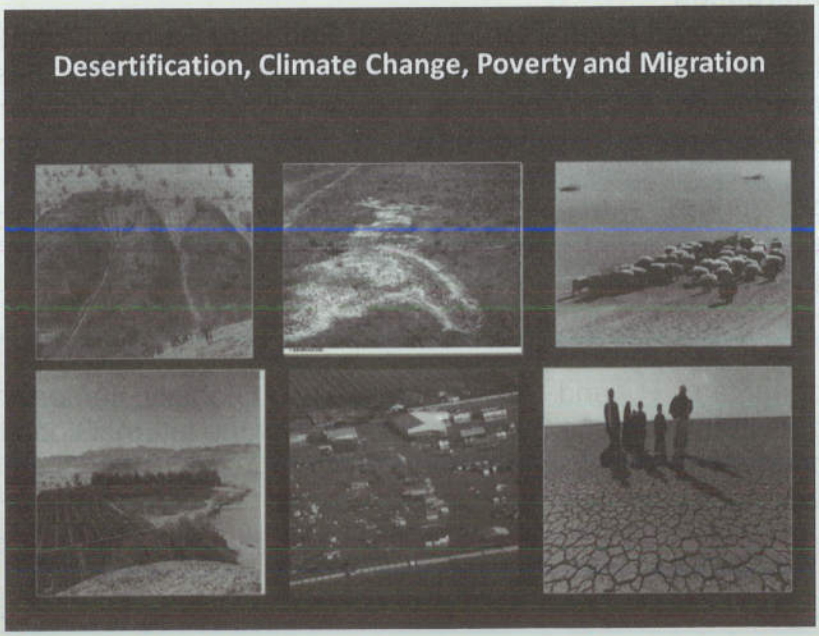
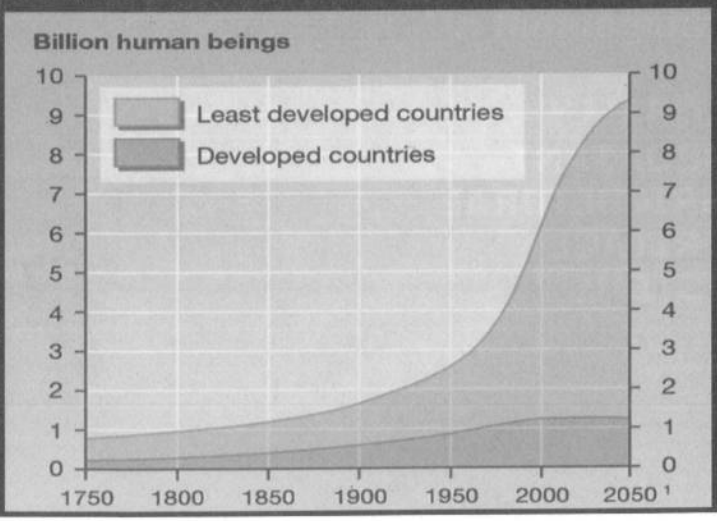

Culture and "Agri" Culture For Sustainable Development
Globally Important Agricultural Heritage Systems (GIAHS)
Dr. Noureddine NASR, FAO

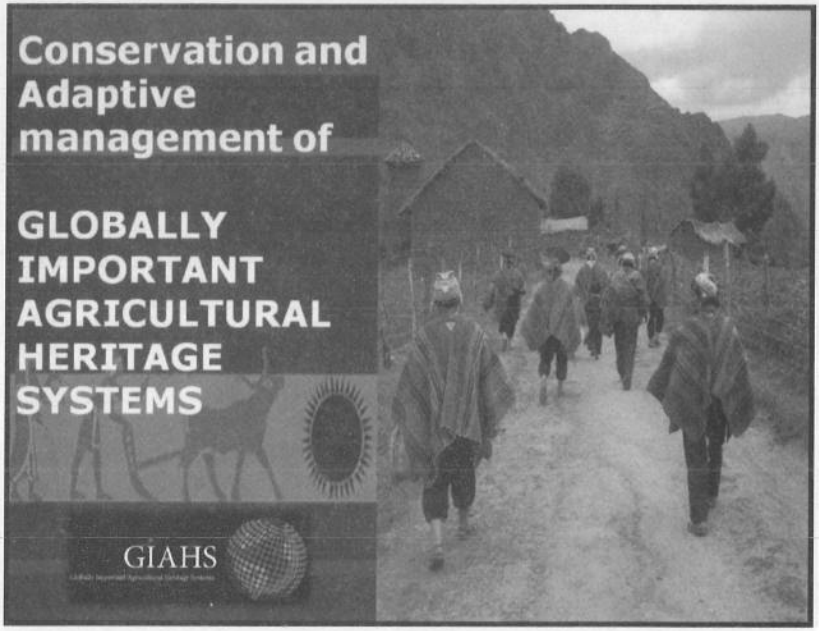

Desertification, Climate Change, Poverty and Migration

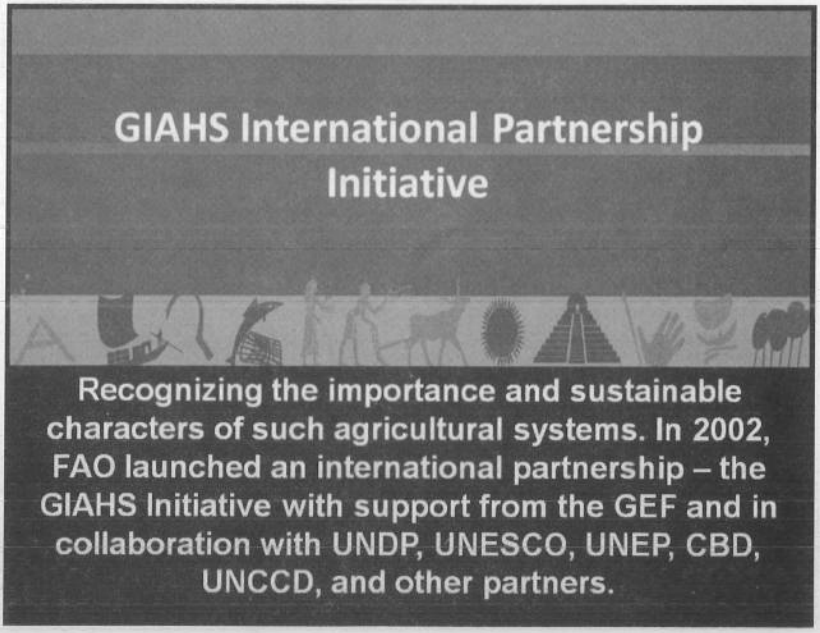
Projected Population Increase

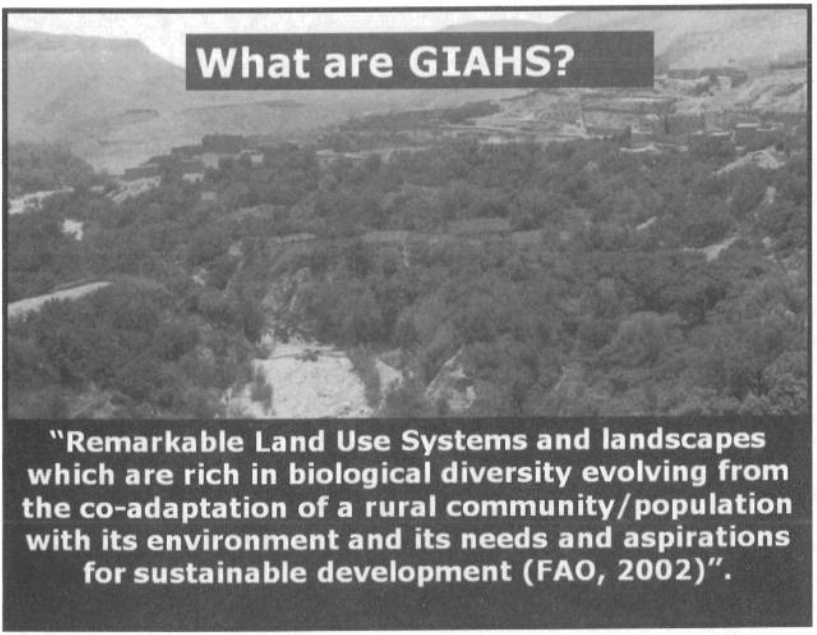


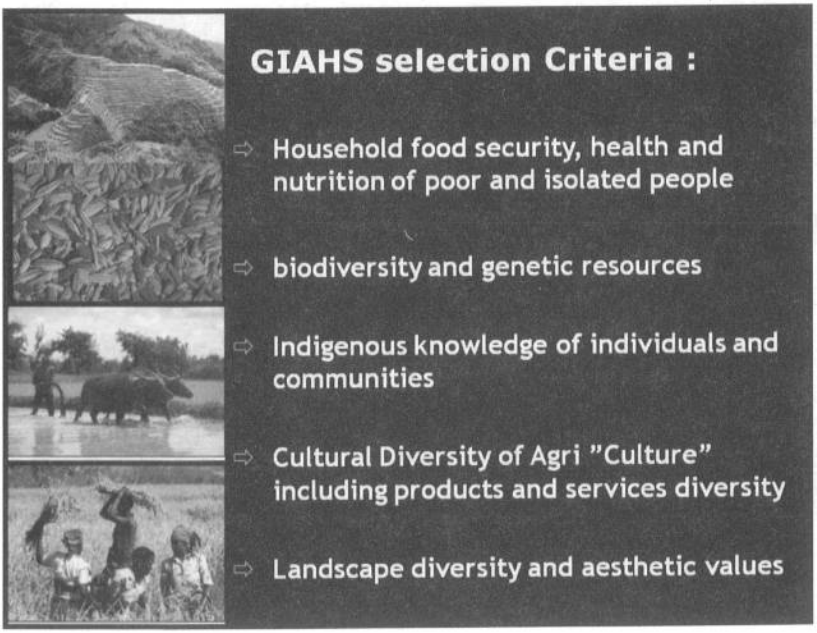
Small Farmer: A Major Challenge?

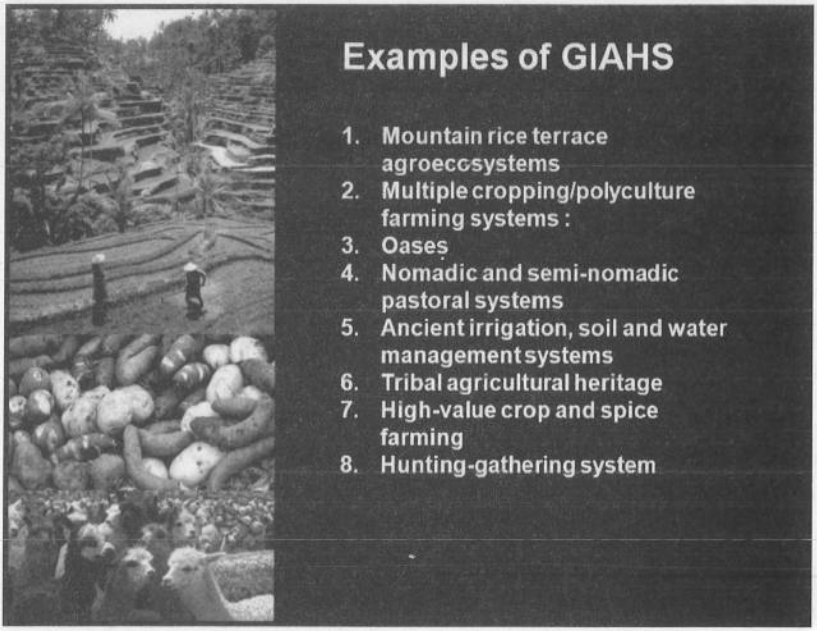
- They are more than 1.4 billion
- They are the poorest of the world's poor
- They are the victims of globalisation and expansion of industrial agriculture
- They are living in marginal lands and environments that are prone to floods, drought, storms and other environmental disasters
- Their agricultural systems harbour the richest BD

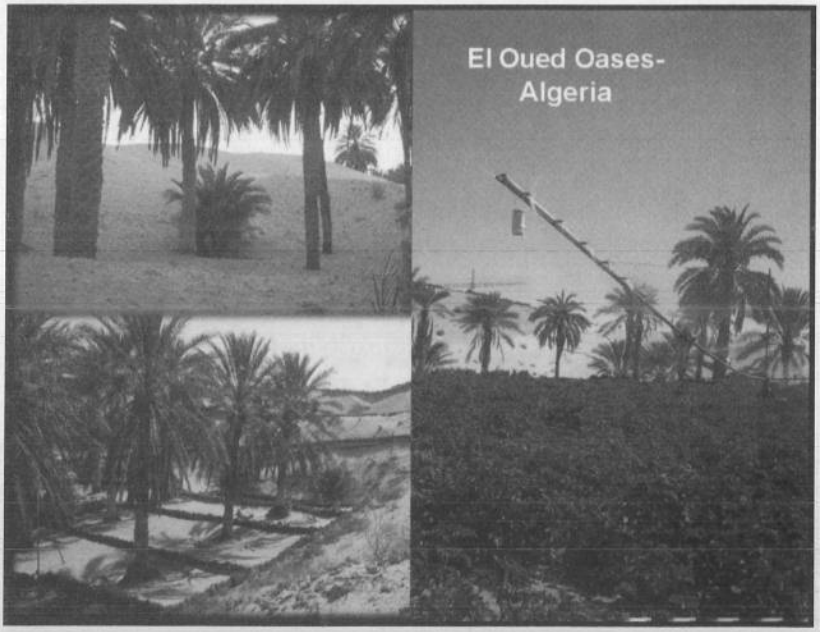

Conservation and Adaptive management of
GLOBALLY IMPORTANT AGRICULTURAL HERITAGE SYSTEMS
GIAHS


GIAHS International Partnership Initiative
Recognizing the importance and sustainable characters of such agricultural systems. In 2002, FAO launched an international partnership – the GIAHS Initiative with support from the GEF and in collaboration with UNDP, UNESCO, UNEP, CBD, UNCCD, and other partners.

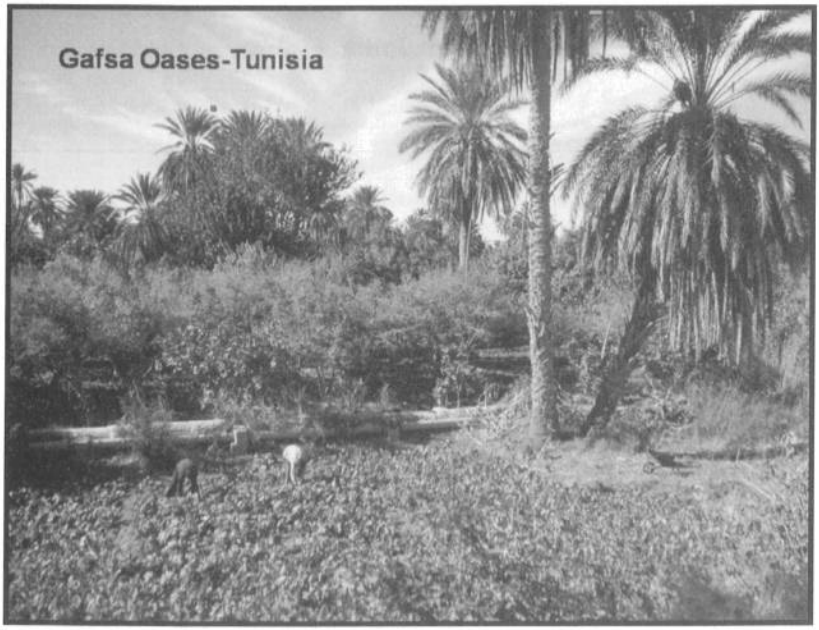

What are GIAHS?
"Remarkable Land Use Systems and landscapes which are rich in biological diversity evolving from the co-adaptation of a rural community/population with its environment and its needs and aspirations for sustainable development (FAO, 2002)".

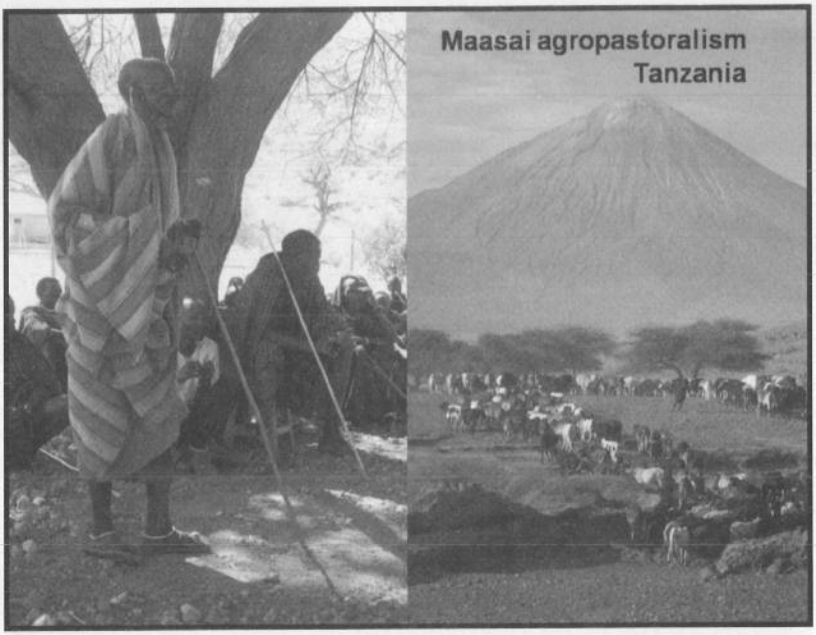

GIAHS selection Criteria :
⇨ Household food security, health and nutrition of poor and isolated people
⇨ biodiversity and genetic resources
⇨ Indigenous knowledge of individuals and communities
⇨ Cultural Diversity of Agri "Culture" including products and services diversity
⇨ Landscape diversity and aesthetic values


Examples of GIAHS
1. Mountain rice terrace agroeccsystems
2. Multiple cropping/polyculture farming systems :
3. Oases
4. Nomadic and semi-nomadic pastoral systems
5. Ancient irrigation, soil and water management systems
6. Tribal agricultural heritage
7. High-value crop and spice farming
8. Hunting-gathering system

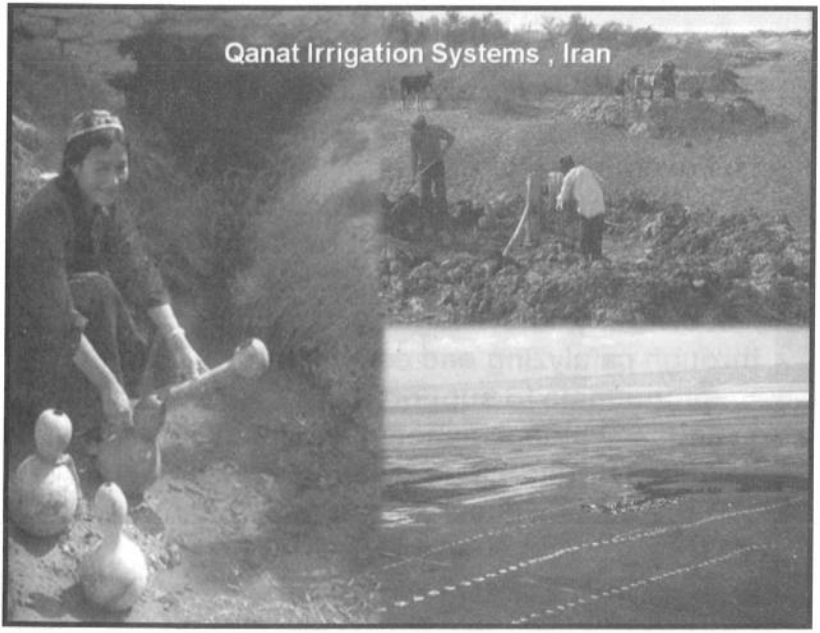

El Oued Oases-
Algeria


Morocco :
Imilchil-Amellago


Gafsa Oases-Tunisia


Maasai agropastoralism
Tanzania


Saffron Heritage System, India



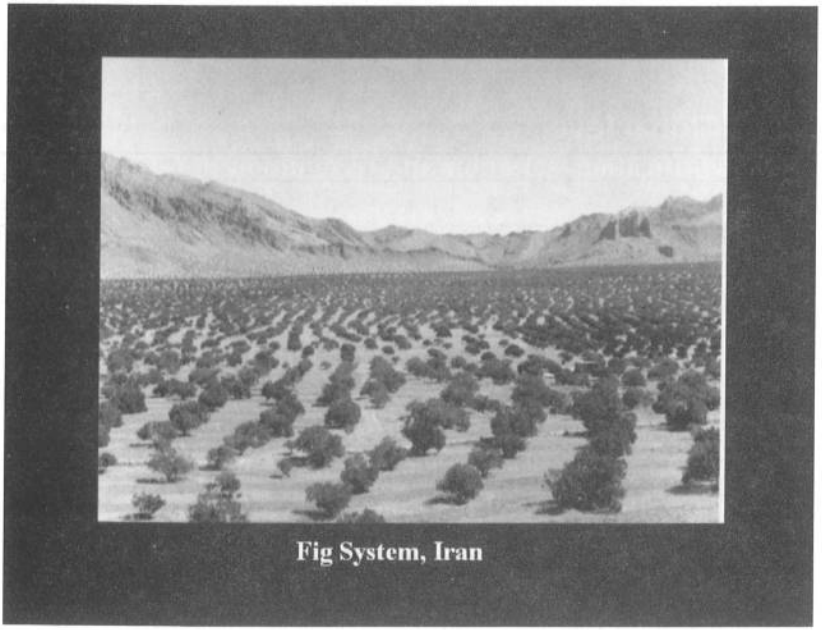


Fig System, Iran

The GIAHS Partnership Initiative

The overall goal of the partnership is to identify, safeguard and promote the international recognition of Agricultural Heritage Systems and their associated landscapes, agricultural biodiversity, knowledge systems and cultures through catalyzing and establishing a long term programme to support such systems and enhance global, national and local benefits derived through their dynamic conservation, sustainable management and enhanced viability.

HOW?

- **At Global level**
  by identification, selection and recognition of GIAHS
- **At National level**
  by capacity building in policy, regulatory and incentive mechanisms to safeguard these outstanding systems and use them as sustainability bench mark systems
- **At Local Level**
  by empowerment of local communities and technical assistance for sustainable resource management, promoting traditional knowledge and enhancing viability of these systems through economic incentives

HOW?

➢ **At Global level**
by identification, selection and recognition of GIAHS

➢ **At National level**
by capacity building in policy, regulatory and incentive mechanisms to safeguard these outstanding systems and use them as sustainability bench mark systems

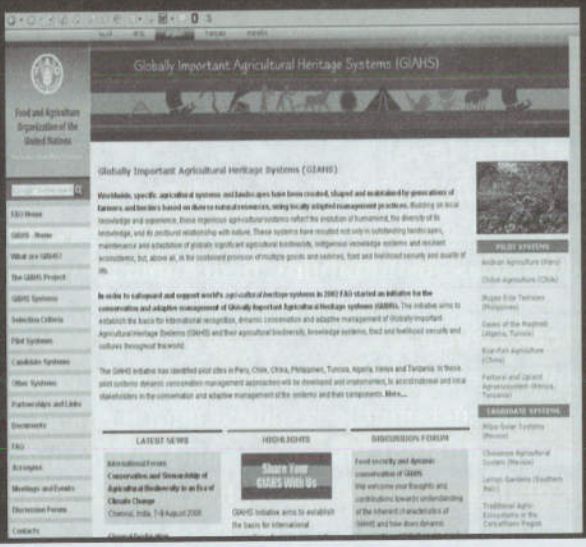
➢ **At Local Level**
by empowerment of local communities and technical assistance for sustainable resource management, promoting traditional knowledge and enhancing viability of these systems through economic incentives

GIAHS is not about the past, it is about the future.

"GIAHS calls for dynamic conservation, emphasizing a balance between conservation, adaptation and socio-economic development".

www.giahs.org

for more details, pls visit:
www.fao.org/nr/giahs or email GIAHS-secretariat@fao.org



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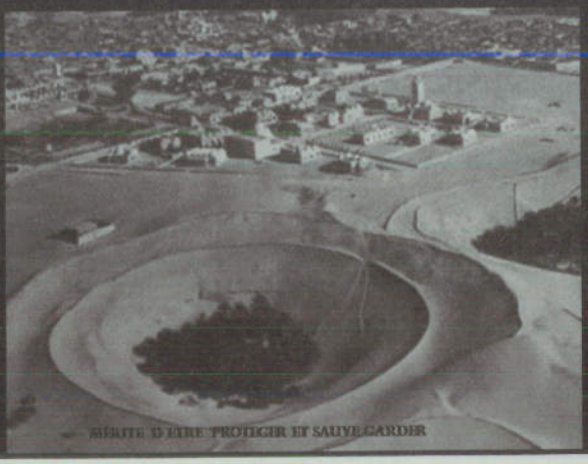

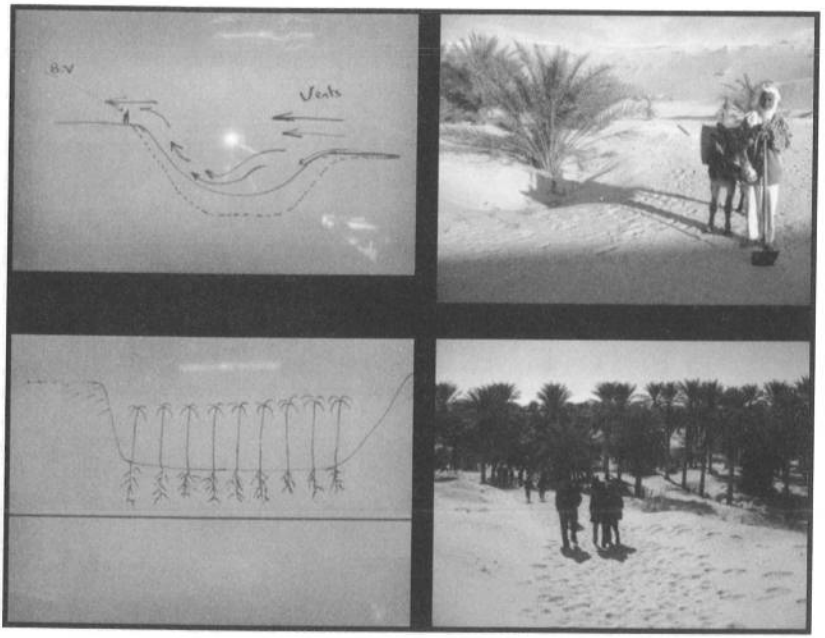
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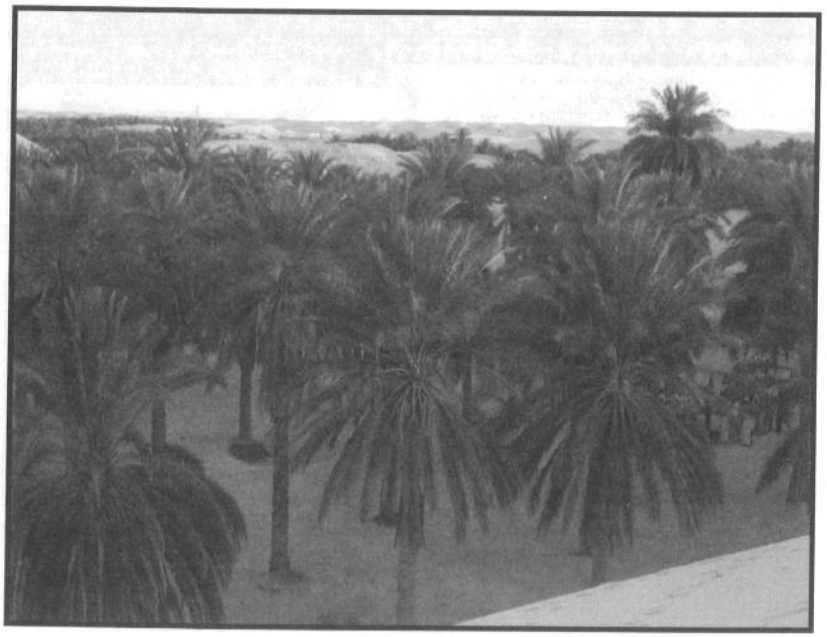
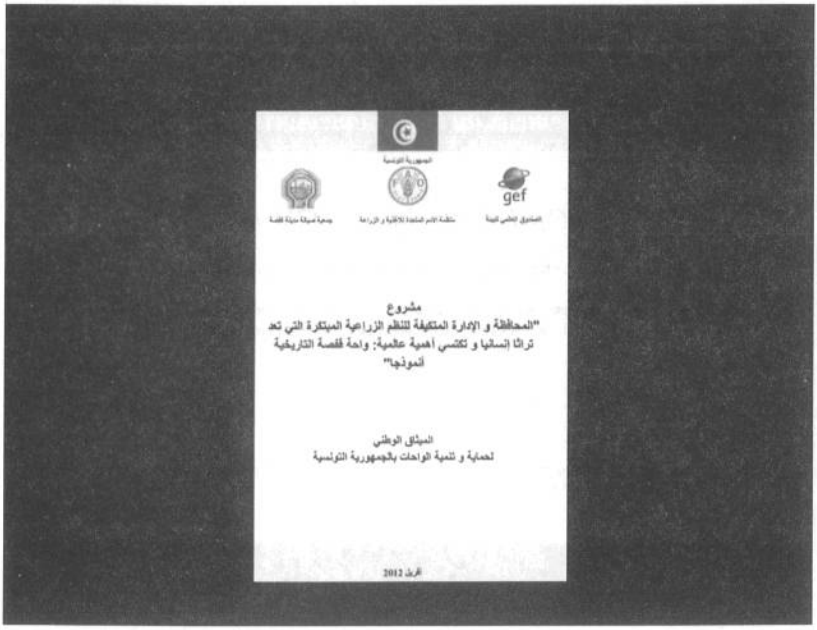



ندوات و ورشات تحسيسية و تكوينية


واحة قفصة التاريخية
L'OASIS HISTORIQUE DE GAFSA
L'OASIS HISTORIQUE DE GAFSA


LA PREMIERE FOIRE DES ABRICOTS
DE L'OASIS DE GAFSA
LA PREMIERE FOIRE DES DATTES A GAFSA
UTICA
GEF
Bioversity International
WAGENINGEN UR


الجمهورية التونسية
gef
مشروع
"المحافظة و الإدارة المتكيفة للنظم الزراعية المبتكرة التي تعد
تراثا إنسانيا و تكتسي أهمية عالمية: واحة قفصة التاريخية
أنموذجا"
المبادئ الوطني
لحماية و تنمية الواحات بالجمهورية التونسية
أفريل 2012

Globally Important Agricultural Heritage Systems

presented to

Oasis froides et agdals d'Imilchil Amellagou

Is certified as a Globally Important Agricultural Heritage System of the importance for present and future generations.

This system provides outstanding contribution to promoting food security, biodiversity, indigenous knowledge and cultural diversity for sustainable development.

June 11, 2011

Parviz Koohafkan
Director, Land and Water Division,
GIAHS Coordinator

Prof. Li Wenhua
Chair, GIAHS Steering Committee

GIAHS

Systèmes Ingénieux du Patrimoine Agricole Mondial

Délivré à

Oasis Historique de Gafsa

Est certifié en tant que Système Ingénieux du Patrimoine Agricole Mondial pour les générations actuelles et futures.

Ce système fournit une contribution remarquable à la promotion de la sécurité alimentaire, de la biodiversité, des savoirs locaux et de la diversité culturelle, dans une perspective de développement durable.

Le 11 juin 2011

Parviz Koohafkan
Directeur de la Division Terres et Eaux,
Coordinateur du SIPAM

Prof. Li Wen Hua
Président du Comité Directeur du SIPAM

GIAHS


Systèmes Ingénieux du Patrimoine Agricole Mondia
Délivré à
Oasis Ghout El-Oued Souf
Est certifié en tant que Système Ingénieux du Patrimoine Agricole Mondial pour les générations actuelles et fu
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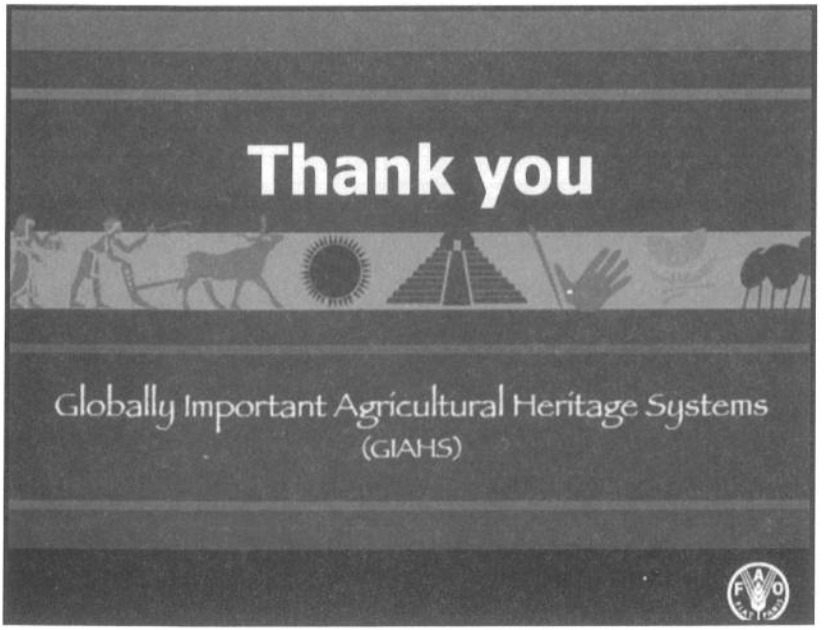
Parviz Koohafkan
Directeur de la Division Terres et Eaux,
Coordinateur du SIPAM
Prof. Li Wen Hua
Président du Comité Directeur du SIPAM
GIAI


Thank you
Globally Important Agricultural Heritage Systems
(GIAHS)

Protected Areas: An Effective ways to Conserve the Deserts Ecosystems

Eng. Mufleh Alaween
IUCN-Regional Office for West Asia and Middle East
Um Uthaina, Tohama Street No. 6,
Amman, Hashemite Kingdom of Jordan
E-mail: mufleh.abbadi@iucn.org

One of the key concerns of the Arab region is the lack of a representative network of Protected Areas that are effectively managed. Protected areas help to conserve key elements of biodiversity, play a significant role in social and economic development, and embody many practical approaches to participatory and collaborative management.

The main objective of the IUCN Protected Areas Programme is to guide and enhance the development of adequate regional approaches and models for effective protected area management, with a focus on community participation and involvement at all levels.

Another objective is to build the region's capacity in protected area management, including the development of sound, and regionally adequate guidelines and mechanisms. To meet this objective we will harmonize the diverse corpus of global knowledge and expertise available through the IUCN network. To further these objectives we also aim to support the regional World Commission on Protected Areas (WCPA) network in achieving its mission, objectives, and outputs.

Some of the tangible results sought by this programme include: Increase the development of protected areas in the region through the reviewing of regional guideline, training of local stakeholders and sustainable funding of these areas. Establish a network of pilot sites documents, fed into national and

regional policies and legislations and shared among all partner in the region. Support the implementation of protected areas in significant biodiversity areas or dedicated to threatened species. Commit initiatives with community welfare and livelihood thanks to sustainable and local management.

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Protected Area As a Management Tool for Conservation of Deserts' Biodiversity

Biodiversity in desert areas Conference
13-14 Sep. 2012
Rabat–Morocco
Eng.Mufleh Al Alaween
Dr.Amer Al Madeat

INTERNATIONAL UNION FOR CONSERVATION OF NATURE

IUCN

Desert Definition

- All agreed that the deserts are always dray
- There are many definition and classification of the desert . The most classifications based on the combination of:
  - No. of rainfall days and total amount .
  - Temperature and humidity or other factors .

In 1953, Peveril Meigs divided desert regions on Earth into three categories according to the amount of precipitation they received.

1. Extremely arid lands have at least 12 consecutive months without rainfall,
2. Arid lands have less than 250 millimeters of annual rainfall.
3. And Semiarid lands have a mean annual precipitation of between 250 and 500 millimeters.

Arid and extremely arid land are deserts, and semiarid grasslands generally are referred to as steppes.

What is the Desert ?

Desert is arid land with low precipitation that supports only limited vegetation ,people and population of animals ,it can be hot, cold , sand ,rock but deserts are always dry .

The ten largest deserts

Deserts take up about one third (33%) of the Earth's land surface.

	Desert	Area (km²)	Area (mi²)	
1.	**Antarctic Desert**	(Antarctica)	13,829,430	5,339,573 2
2.	**Arctic Desert**	(Arctic)	13,726,937	1,003,600+ 3
3.	**Sahara Desert**	(Africa)	9,100,000+	3,320,000+ 4
4.	**Arabian Desert**	(Middle East)	2,330,000	900,000 5
5.	**Gobi Desert**	(Asia)	1,300,000	500,000 6
6.	**Kalahari Desert**	(Africa)	900,000	360,000 7
7.	**Patagonian Desert**	(South America)	670,000	260,000 8
8.	**Great Victoria Desert**	(Australia)	647,000	250,000 9
9.	**Syrian Desert**	(Middle East)	520,000	200,000 10
10.	**Great Basin Desert**	(North America)	492,000	190,000

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Flora in Desert

- Deserts have a reputation for supporting very little life, but in reality deserts often have high biodiversity.
- Some desert flora include shrubs, Prickly Pears, Desert Holly, and the Brittlebush.
- Most desert plants are drought- or salt-tolerant.
- Some store water in their leaves, roots, and stems.
- Other desert plants have long taproots that penetrate to the water table if present, or have adapted to the weather by having wide-spreading roots to absorb water from a greater area of the ground.

IUCN

Fauna

- Desert fauna include animals that remain hidden during daylight hours to control body temperature or to limit moisture needs.
- Some fauna includes the kangaroo rat, coyote, jack rabbit, and many lizards

Human life in deserts

- A desert is a hostile, potentially deadly environment for unprepared humans.
- In hot deserts, high temperatures cause rapid loss of water due to sweating, and the absence of water sources with which to replenish it can result in dehydration and death within a few days.
- In addition, unprotected humans are also at risk from heatstroke

Some challenges effecting the biodiversity management in the desert area :

- Over pumping of ground water by the residents for agriculture
- Wind erosion due to the scarcity of the plants (occur easily)
- Over grazing
- Strong and dry wind hydrates soil and living things and remove organic matters that makes soil fertile .
- Freezing and melting of water (night and midday)increase rock cracking .
- The high different in the temperature between day and night , expansion under sun and contraction at night weaken the surface and causing flaking .
- High evapotrspirtation
- Climate change (flood , low rainfall , storm ..etc)

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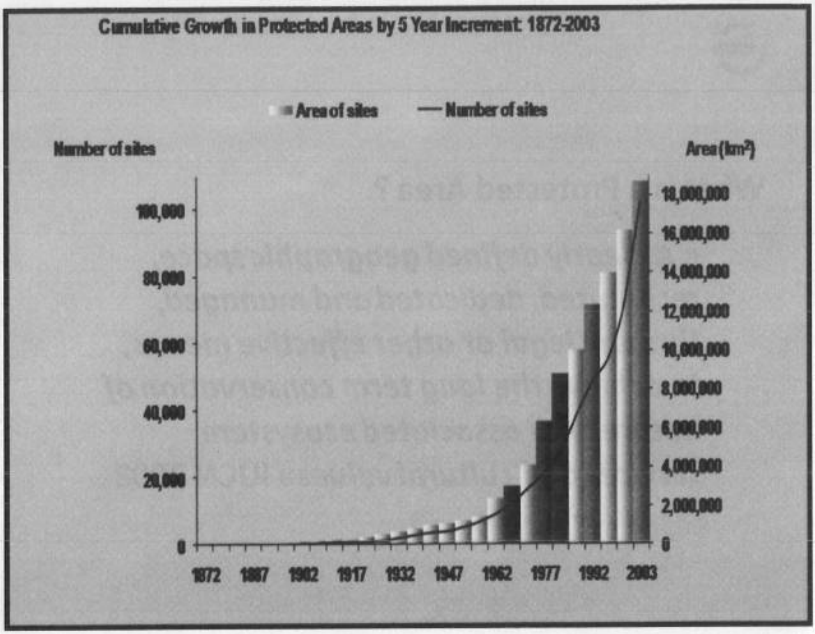
What is a Protected Area ?

***« A clearly defined geographic space, recognized, dedicated and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values»* IUCN 2008**

IUCN

Protected Areas now cover more than 12% of the earths surface. The numbers of such areas have increased rapidly in recent years and protected areas are now a major land use in their own right


Cumulative Growth in Protected Areas by 5 Year Increment: 1872-2003
Area of sites
Number of sites
Number of sites
Area (km²)
100,000
80,000
60,000
40,000
20,000
0
18,000,000
16,000,000
14,000,000
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
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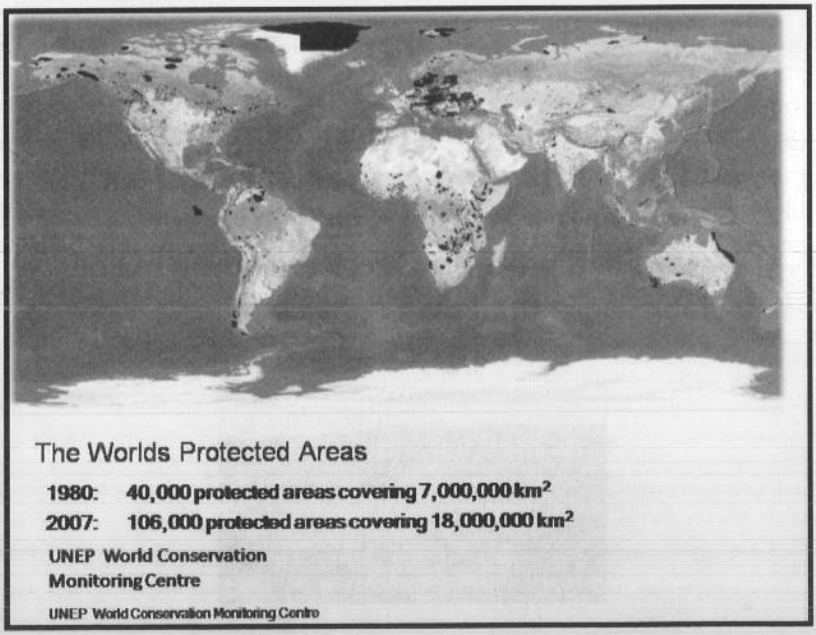
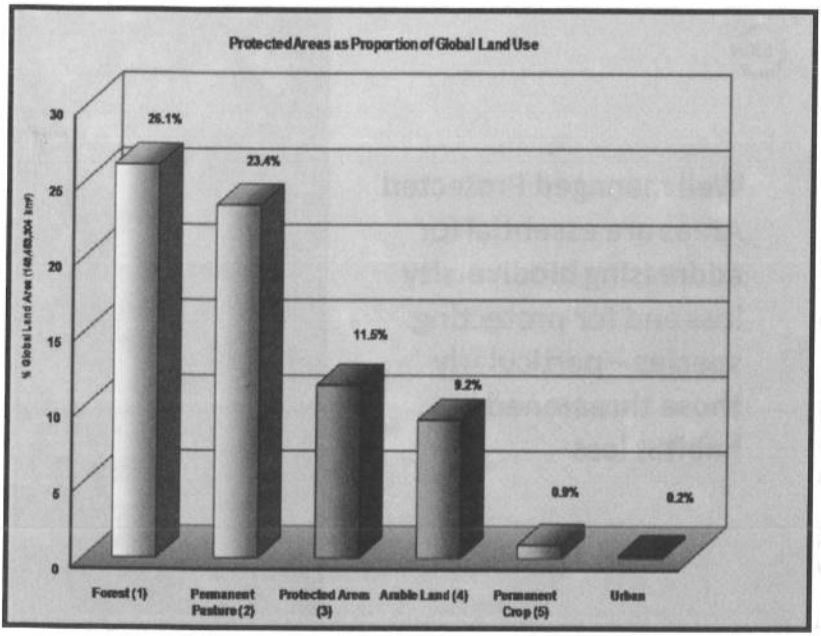
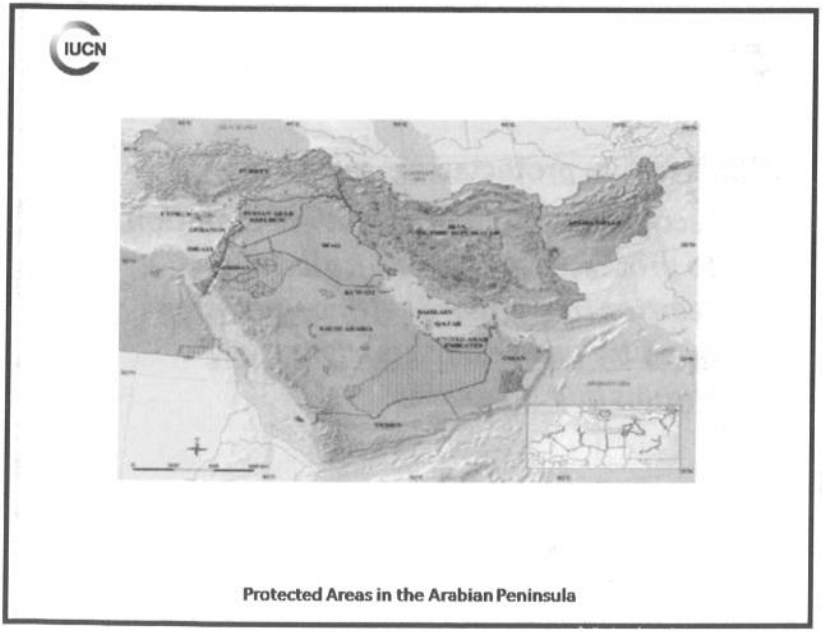
1887
1902
1917
1932
1947
1962
1977
1992
2003


The Worlds Protected Areas
1980: 40,000 protected areas covering 7,000,000 km²
2007: 106,000 protected areas covering 18,000,000 km²
UNEP World Conservation Monitoring Centre
UNEP World Conservation Monitoring Centre





Protected Areas in the Arabian Peninsula

IUCN

Well managed Protected Areas are essential for addressing biodiversity loss and for protecting species – particularly those threatened by habitat loss

IUCN

IUCN's role in protected areas:

recognized as a global leader in relation to protected areas, particularly in relation to standard setting, provision of policy advice and convening key forums and dialogues

IUCN

Key IUCN strengths and activities in protected Areas:

1) **Knowledge – preparation of practical guidance on a range of management issues, such as through the Protected areas Best Practice Series**
2) **Convening – major events such as the World Parks Congress, convened by IUCN every 10 years**
3) **Standard Setting – such as in relation to the IUCN PA Category System**
4) **Advising Conventions and Agreements: such as the World Heritage Convention (for cultural and natural heritage preservation in the world) and the Convention on Biological Diversity**
5) **Support for protected areas field projects, such as training PA managers in developing countries**

IUCN

Historical Perspective

Efforts to protect the landscape go back to ancient history:

- The Roman Emperor Hadrian (AD 117-138) was reported to have demanded protection for some of the remaining cedar forests on Mount Lebanon (though only a few remnants remain today).
- One traditional form of land management, known as al hema (hima, hurah, or ahmia), has been used for more than 2 000 years, and was given a clearer legal standing by the Prophet Mohammed (صلى الله عليه و سلم).
- Forest reserves and hunting reserves were declared in the 18th and 19th centuries when wide parts of this region fell under the Ottoman Empire

IUCN

The Protected Areas Network

- Most protected areas have been established since the 1970s and 1980s.
- Today there are 1 324 protected areas in the region(Arab region) which cover an estimated10 percent of the land area.
- Few countries(Egypt, Jordan, Oman, and Saudi Arabia) have extensive protected areas, and the rest of countries have less than 2 percent of their land area within protected areas.

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IUCN

The Protected Areas Network

Country/territories		Land area (km2)	Total protected area (km2)	Total number of sites
Afghanistan		652 090	2 186	7
Algeria		2 381 740	119 726	26
Bahrain		690	60	4
Cyprus		9 250	920	19
Egypt		1 001 450	103 939	48
Iran, Islamic Republic of		1 633 190	112 878	142
Iraq		438 320	5	8
Jordan	10	89 210	9 734	36
Kuwait		17 820	597	7
Lebanon		10 400	78	24
Libyan Arab Jamahiriya		1 759 540	2 209	12
Morocco	1.3	446 550	6 107	35
Oman	14	212 460	29 828	6
Qatar		11 000	137	13
Saudi Arabia	38	2 149 690	826 432	81
Syrian Arab Republic		185 180	3 583	28
Tunisia		163 610	2 579	42
Turkey		774 820	3 3532	474
United Arab Emirates		83 600	4559	19
Western Sahara		266 000	18 889	1
Yemen		527 970	527 970	4

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The IUCN Categories of Protected Areas

- Ia: **Strict Nature Reserve**: managed mainly for science
- Ib: **Wilderness Area**: managed mainly for wilderness protection
- II: **National Park**: managed mainly for ecosystem protection and recreation
- III: **Natural Monument**: managed mainly for conservation of specific natural features
- IV: **Habitat/Species Management Area**: managed mainly for conservation through management intervention
- V: **Protected Landscape/Seascape**: managed mainly for landscape/seascape conservation and recreation
- VI: **Managed Resource Protected Area**: managed mainly for the sustainable use of natural ecosystems

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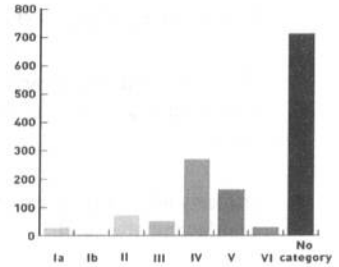
Protected Areas Network By IUCN Category

IUCN category	Total Sites	Total Areas (Km2)
Ia	28	3496
Ib	2	31
II	71	215874
III	50	12432
IV	269	69806
V	162	114762
VI	30	790662
No category	712	78687
Total	1324	1285749

North Africa and the Middle East: Number of protected areas by IUCN category, 2005



22

IUCN

CHALLENGES

Training and capacity to manage

- Lack of skilled staff is a major constraint on the effective establishment and management of protected areas.
- Disciplines as protected area planning and management, wildlife management, and environmental sociology are not yet widely recognized by the region's academic institutions.
- Almost no university courses or degree programs in the subjects most closely related to protected area management.

23

IUCN

CHALLENGES

Legislation

- The legislative basis for protected areas is still weak in the region.
- Most countries have some protected area legislation.
- There are also few provisions to involve local citizens as participants in the establishment and management of protected areas.
- In many instances, implementation and enforcement are given insufficient attention.

24

IUCN

CHALLENGES

Pilot protected areas

- There is an acute need to expand the protected area systems to represent those ecosystems where there is no protection,
- and to conserve endangered endemic and relict species of plants and animals, as well as species of special ecological, economic, or cultural value.
- Conserve key sites of biological productivity –wetlands, mountains, and woodlands, and coastal sites – that constitute the habitats of the majority of the region's flora and fauna.

25

IUCN

CHALLENGES

Ecotourism

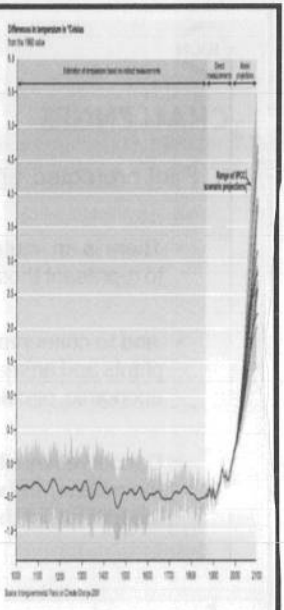
- One of the most promising ways for protected areas to generate tangible and sustainable benefits is from nature-based tourism.
- Ecotourism can provide a meaningful incentive and economic justification for conservation, as it depends on the maintenance of unspoiled nature and thriving communities of wild plants & animals.
- In addition, it can generate an influential and articulate clientele who can serve as advocates for the conservation of protected areas.
- If it is not managed very carefully, however, nature-based tourism tends to degrade the resources upon which it depends.

26

IUCN

FUTURE DIRECTIONS INCLUDE

(1) Addressing impacts of climate change. Particularly through developing landscape level initiatives which link protected areas with other land uses.



IUCN

FUTURE DIRECTIONS INCLUDE

(2) Targeted expansion of PAs in poorly represented biomes. Increasing the protection of the marine environment is a major priority(with Focus in the deserts areas)

IUCN

FUTURE DIRECTIONS INCLUDE

(3) Strengthening management effectiveness (capacity building and PA finance). The IUCN Management effectiveness framework is a tool being used in many countries

29

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FUTURE DIRECTIONS INCLUDE

(4) Involving local communities and Indigenous Peoples in protected areas.

PAs managed by local communities have become increasingly important

30


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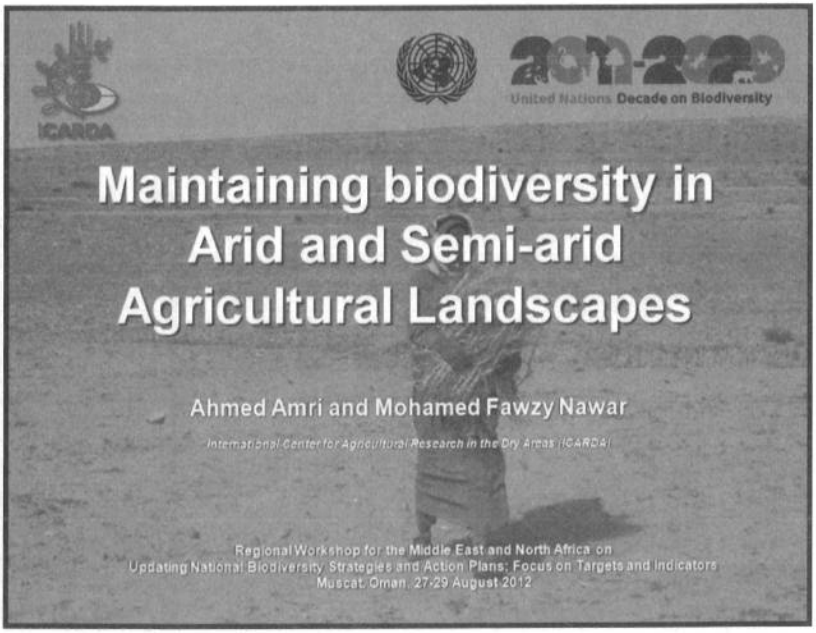
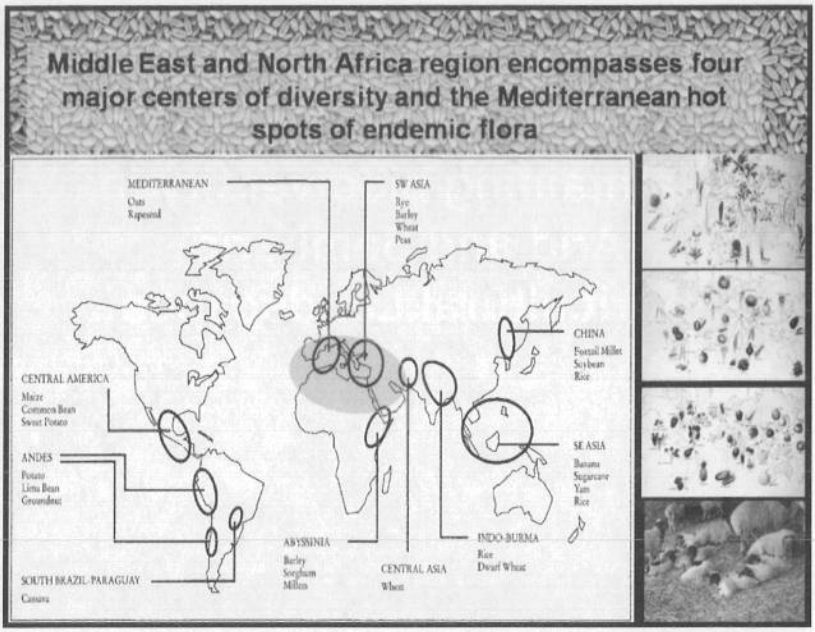
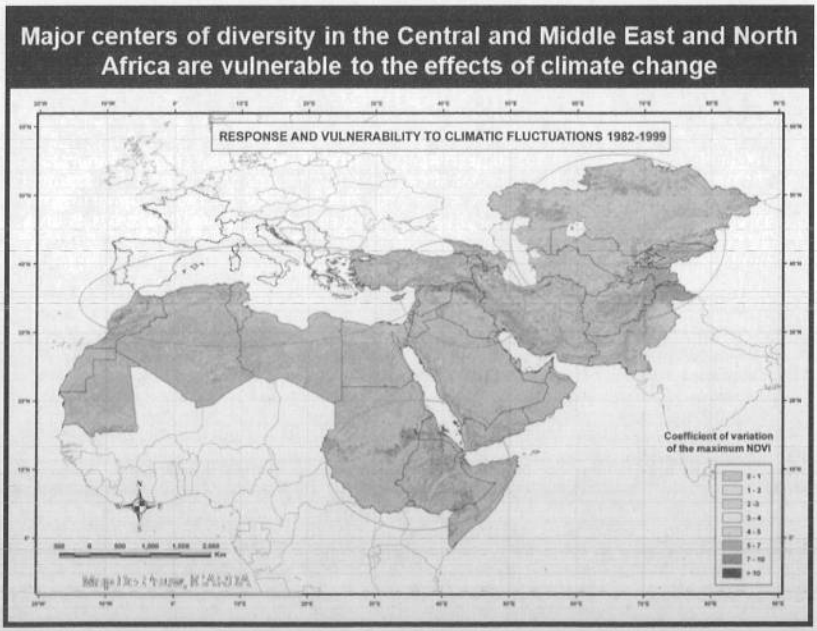
THANK YOU



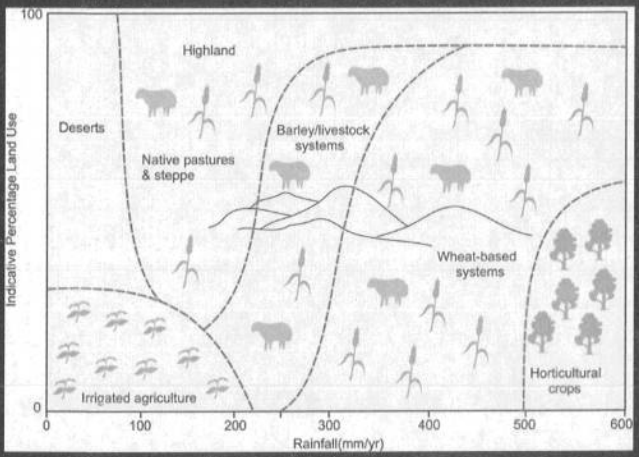
Characteristics and importance of dryland agrobiodiversity

- Drylands regions cover about 40 percent of the world's surface. In MENA region they represent more than 80%.
- Dryland regions encompass major primary and secondary centers of diversity of global importance including for wheat, barley, lentil, forage legumes and many dryland fruit and nut crops including olive, fig, pistachio, almond, etc., and for small ruminants.
- Traditional farming systems are still prevailing in drylands, mountainous regions and Oasis areas.
- Rather known for its within species diversity but Mediterranean ecosystems are well known for their high species richness and endemism;
- Fragile environments that can lead to irreversible loss.
- Alarming loss of dryland agrobiodiversity due to habitats destruction, overuse, etc.
- Dryland agrobiodiversity is important for sustaining agricultural development and food security and in supporting the livelihoods of agricultural and pastoral communities;
- Dryland agrobiodiversity crucial for overcoming the major global concerns of desertification, global warming, loss of biological diversity and reducing rural poverty;
- Important source for commercial and industrial products (gums, resins, oils, biocides) and plant medicinal products;
- Inherent attributes for quality, adaptation including tolerance to extreme temperatures, drought, salinity,…;
- Drylands provide critical habitats for wild life and are indispensable for many migrating species;


Middle East and North Africa region encompasses four major centers of diversity and the Mediterranean hot spots of endemic flora
MEDITERRANEAN
Oats
Rapeseed
SW ASIA
Rye
Barley
Wheat
Peas
CHINA
Foxtail Millet
Soybean
Rice
CENTRAL AMERICA
Maize
Common Bean
Sweet Potato
ANDES
Potato
Lima Bean
Groundnut
SE ASIA
Banana
Sugarcane
Yam
Rice
ABYSSINIA
Barley
Sorghum
Millets
CENTRAL ASIA
Wheat
INDO-BURMA
Rice
Dwarf Wheat
SOUTH BRAZIL-PARAGUAY
Cassava


Major centers of diversity in the Central and Middle East and North Africa are vulnerable to the effects of climate change
RESPONSE AND VULNERABILITY TO CLIMATIC FLUCTUATIONS 1982-1999
Coefficient of variation of the maximum NDVI

Agricultural Environments and Farming Systems in MENA region



State of ratification (* signing) of major biodiversity related international agreements by the MENA countries

Agreements	N. countries	Period	Countries
CBD	**16 (+4)**	**1993-2003**	**ALG,BAH,EGY,JOR,LEB,LIB,MAUR, MOR,QAT,SYR,TUN,UAE,YEM, (DJI,OMA,SUD, SAR)*, TUR,AFG, IR**
UNCCD	17	1995-1999	ALG,EGY,JOR,KWT,LIB,MAUR,MOR, OMA,QAT,SAR,SYR,TUN,UAE,YEM, TUR,AFG, IRA
CITES	16	1975-2001	ALG,EGY,JOR,MAUR,MOR,OMA,QAT,SAR, SUD,SYR,TUN,UAE,YEM, TUR,AFG, IR
Wetlands	12	1977-2000	ALG,BAH,EGY,JOR,LEB,LIB,MAUR, MOR,SYR,TUN, TUK, IR
Cartagena Protocol	4 (+8)	2003-2007	ALG,EGY,JOR,TUN, (SUD,DJI,LIB,MAUR,SYR,OMA,QAT,SAR)*
UPOV	4	-	JOR, TUN , EGY, MOR
FAO-PGRFA Commission	17		All except BAH and DJI
WHC	17	-	ALG,BAH,EGY,IRAQ,JOR,LEB,LIB, MAUR,MOR,OMA,PAL,QAT,SAR,SUD,SYR, TUN,YEM
ITPGRFA	**10 (+10)**	**2001-2004**	**EGY,JOR,LEB, MOR, SUD,SYR,TUN, (ALG,LIB,MAUR,DJI, KUW, OMA, QAT,SAR,UAE,YEM)* , IR, TUR, AFG**

Institutional arrangements for *ex situ* conservation in Arab countries

Countries	Strategy Action Plan	Number institutions	National focal institution	National PGR committee	Long-term conservation	Cryo-conservation	Field genebanks
Morocco	Yes	5	No	Yes (1992)	Yes	Yes	Yes
Algeria	Draft	4	INRAA (2007)	No	No	No	Yes
Tunisia	Yes	6	NGBT (2007)	Yes (2007)	Yes	Yes	Yes
Libya	No	1	No	No	No	No	Yes
Egypt	Yes	9	NGB (2004)	Yes (1994)	Yes	Yes	Yes
Syria	Yes	2	GCSAR (2001)	Yes (2004)	Yes	No	Yes
Sudan	Yes	3	No		Yes	Yes	Yes
Lebanon	Yes	2	No	No	No	No	Yes
Jordan	Yes	3	NCARTT (2002)	Yes (2001)	Yes	No	Yes
Iraq	No	1	No	No	No	No	Yes
Qatar	No	2	No	No	No	No	Yes
Kuwait	No	2	No	No	No	No	Yes
Saudi Arabia	No	3	No	No	No	No	Yes
Oman	No	2	No	No	Yes	No	Yes
UAE	No	2	No	No	No	Yes	Yes
Yemen	Yes	2	No	No	No	No	Yes

Distribution of genetic resources and major genebanks worldwide

TABLE 3 Genebanks and accessions in ex situ collections by region (8)

Region	Accessions		Genebanks	
	Number	%	Number	%
Africa	353,523	6	124	10
Latin America & the Caribbean	642,405	12	227	17
North America	762,061	14	101	8
Asia	1,533,979	28	293	22
Europe	1,934,574	35	496	38
Near East	327,963	6	67	5
Total	5,554,505	100	1,308	100
CGIAR	593,191	—	12	—

Total number of seed accessions conserved in Arab genebanks in 2007: 91,519.

State of the World PGRFA and the Global Plan of Action

Limited information is available for MENA region to contribute to the State of the World and the Global Plan of Action

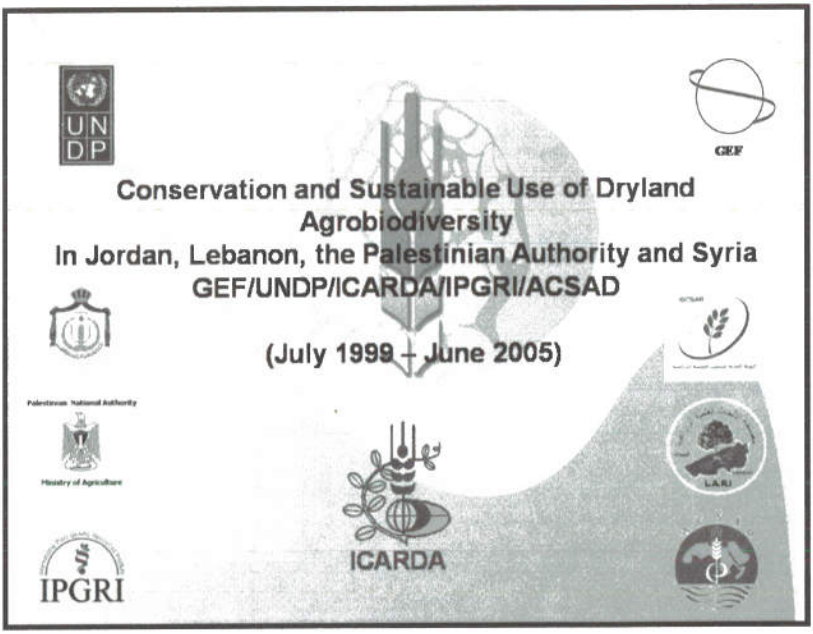
- *State of biodiversity*
- *State of in situ conservation*
- *State of Ex situ conservation*
- *State of utilization*
- *Contribution of PGRFA management to food security and sustainable development*
- *State of national programs, training, and legislation*

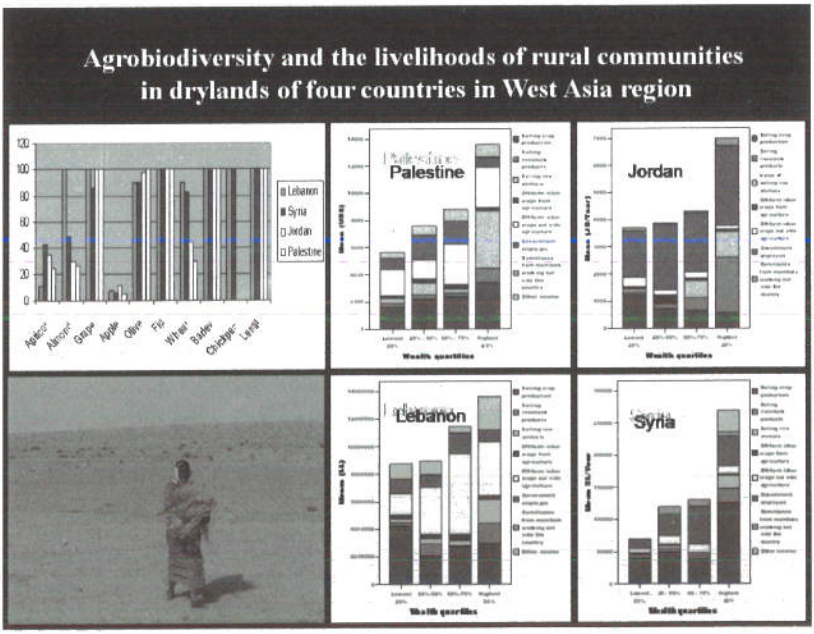
2010

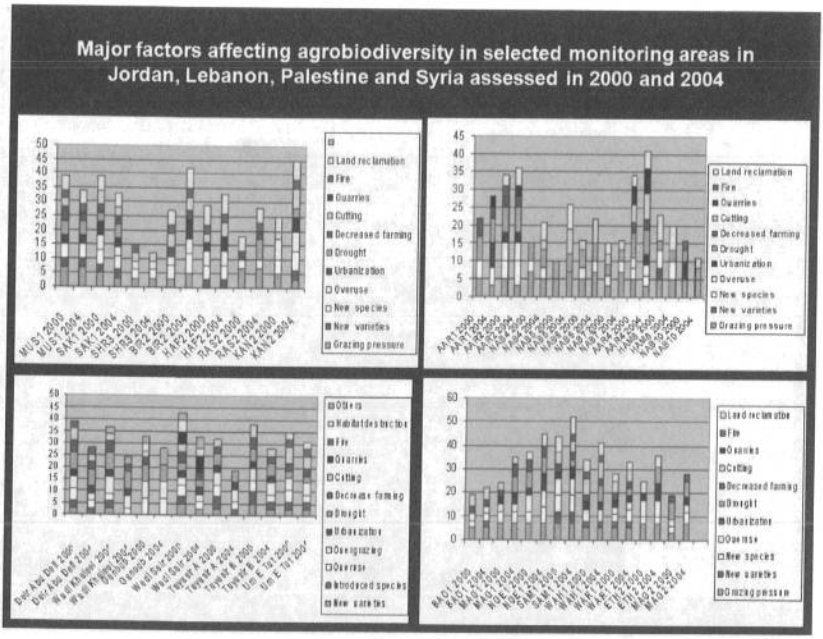
Status of genetic resources at ICARDA genebank

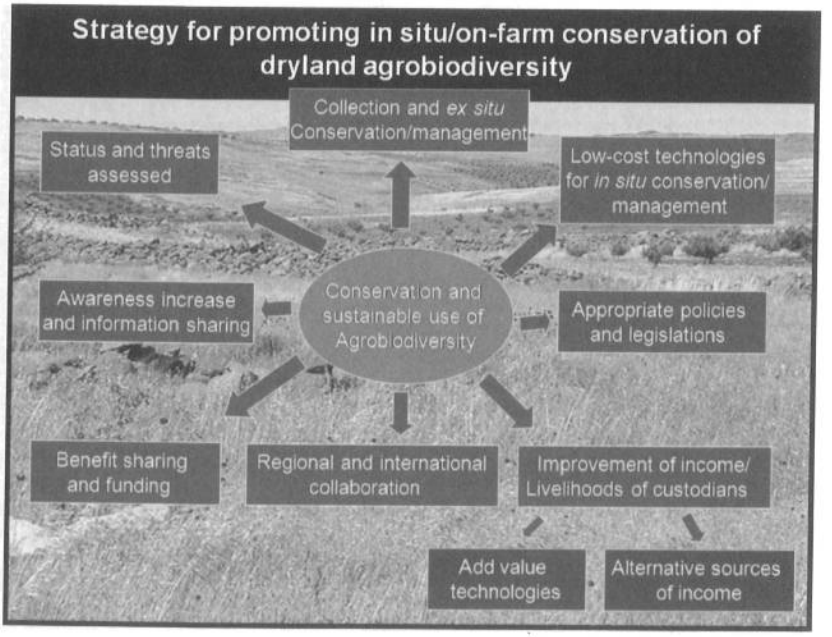
Crops (percent	Total accessions conserved	Breeding germplasm to be processed into collections	Accessions safe duplicated (%)	Accessions safe duplicated Svalbard	5th shipment to Svalbard
Barley	24998	17,000	24854 (99.42%)	21,851 (87.41%)	2542
Wild *Hordeum*	1977	-	1897 (95.95%)	1407 (71.17%)	90
Bread wheat	13576	7,000	13173 (97.03%)	10,621 (78.23%)	1537
Durum wheat	19592	3,000	19588 (99.98%)	18,031 (92.03%)	853
Primitive wheat	912	-	910 (99.78%)	417 (45.72%)	208
Wild *Triticum*	1584	-	1583 (99.94%)	1390 (87.75%)	179
Aegilops	3985	-	3881 (97.39%)	2708 (67.95%)	365
Faba bean	9424	5200	5818 (92.92%)	4538 (72.48%)	27
Chickpea	13553	2800	12932 (95.42%)	8426 (62.17%)	1906
Wild *Cicer*	270	-	265 (98.15%)	144 (53.33%)	-
Lentil	10425	1000	10399 (99.75%)	9531 (91.42%)	670
Wild *Lens*	587	-	587 (100%)	574 (97.79%)	-
Lathyrus	3341	1800	3235 (96.83%)	2433 (72.82%)	1
Vicia	6143	-	5682 (92.5%)	3385 (55.1%)	26
Medicago	8397	-	8346 (99.39%)	6469 (77.04%)	22
Trifolium	4536	-	4303 (94.86%)	1596 (35.19%)	9
Pisum	6105	-	5804 (95.07%)	3752 (61.46%)	44
Other range species	5782	-	4486 (77.59%)	3321 (57.44%)	86
Others	219	7800	106 (48.4%)	16 (7.3%)	2
Total	135,406	45,600	130,956 (96.71%)	102,105 (75.41%)	8576

Total deposited at Svalbard 110,672 accessions


UNDP
GEF
Conservation and Sustainable Use of Dryland Agrobiodiversity
In Jordan, Lebanon, the Palestinian Authority and Syria
GEF/UNDP/ICARDA/IPGRI/ACSAD
(July 1999 – June 2005)
Palestinian National Authority
Ministry of Agriculture
ICARDA
IPGRI
LARI


Agrobiodiversity and the livelihoods of rural communities in drylands of four countries in West Asia region
Lebanon
Syria
Jordan
Palestine
Palestine
Jordan
Lebanon
Syria
Wealth quartiles


Major factors affecting agrobiodiversity in selected monitoring areas in Jordan, Lebanon, Palestine and Syria assessed in 2000 and 2004


Strategy for promoting in situ/on-farm conservation of dryland agrobiodiversity
Collection and ex situ Conservation/management
Status and threats assessed
Low-cost technologies for in situ conservation/ management
Awareness increase and information sharing
Conservation and sustainable use of Agrobiodiversity
Appropriate policies and legislations
Benefit sharing and funding
Regional and international collaboration
Improvement of income/ Livelihoods of custodians
Add value technologies
Alternative sources of income

Framework for development of management plan for *in situ* management of agrobiodiversity

Options/Levels	Technological	Add-value	Alternative sources of income	Human and Institutional capacity	Policy
International					
Regional					
National					
Community					
Farm/habitat					
Species/crop					

Assessing and monitoring agrobiodiversity and its threats

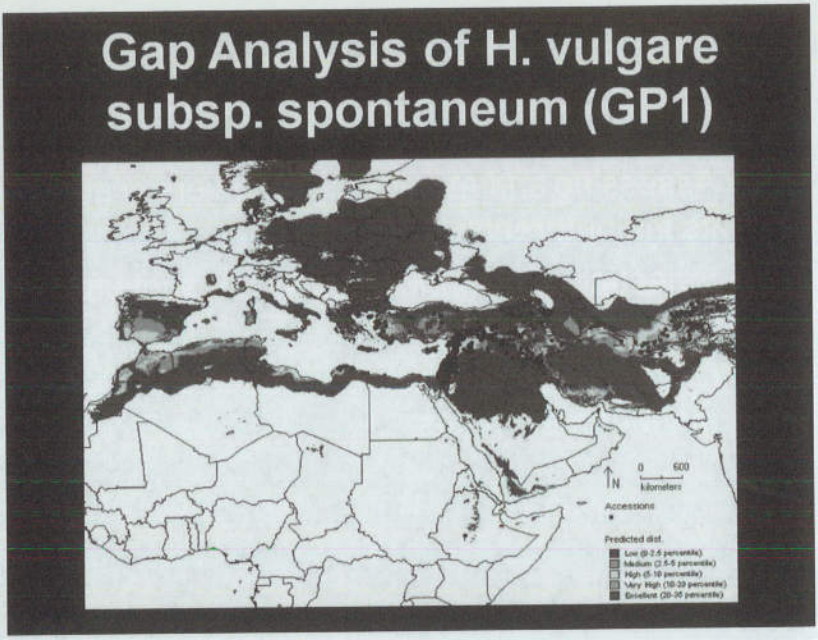
- Conducting periodical eco-geographic and botanic surveys in selected areas in four countries;
- Follow-up of *in situ* conservation sites in Syria;
- Use of GIS/RS tools for assessing the status and trends of agrobiodiversity;
- Develop software and database related to *in situ* conservation of agrobiodiversity;
- Selecting priority biodiversity hot spots for *in situ* conservation;
- Conducting farming systems surveys and gender roles;
- Characterization of local breeds of small ruminants;
- Investigation of the effects of climate change and land degradation on dryland agrobiodiversity.
- Contribute to update of IUCN red list;
- Assessment of the extent to which existing protected areas are conserving dryland agrobiodiversity, mainly crop wild relatives.

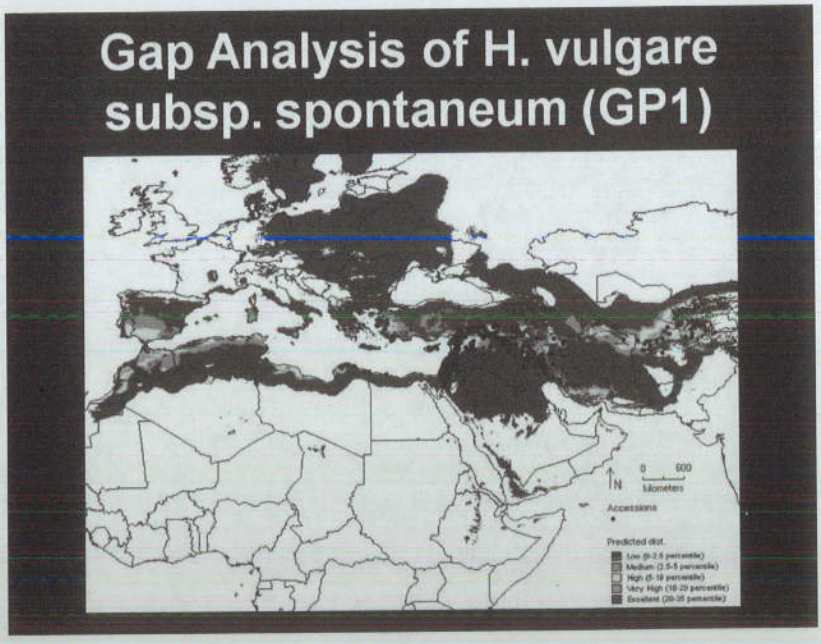
Researchable issues

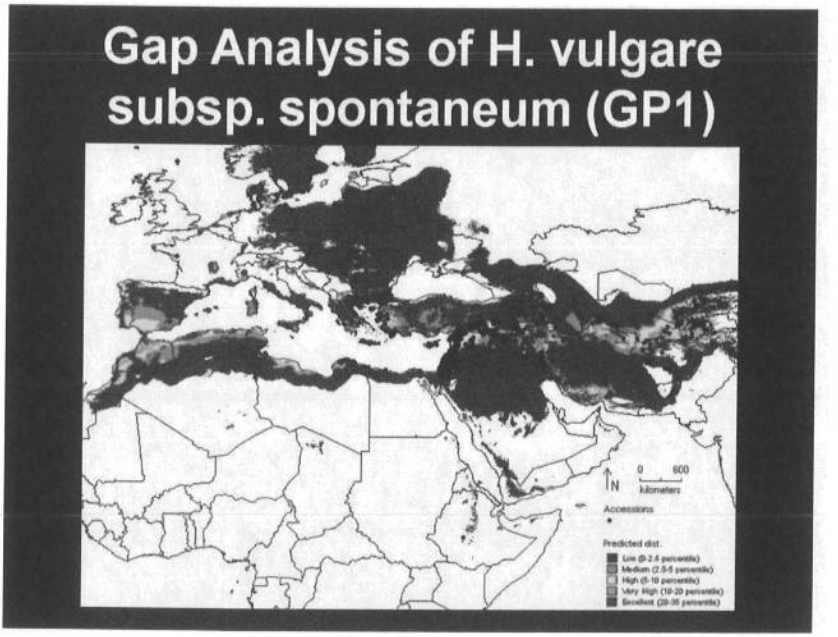
- Assessing and monitoring biodiversity and its major threats;
- Selecting priority biodiversity hot spots for in situ conservation;
- Development and demonstration of management plans;

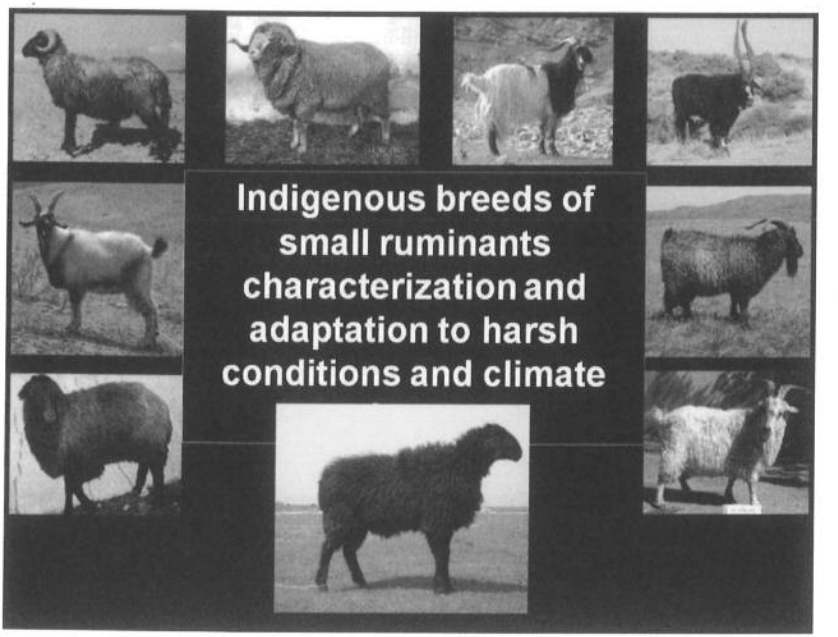
Policy options

- Development of national agrobiodiversity conservation strategy;
- Land use suitability maps;
- Use of native species for rehabilitation of degraded systems (reforestation, etc.);
- Farmers rights and local knowledge issues;
- Awareness increase including introduction of biodiversity in education systems;
- Contribution to regional and global actions/fora (networking) on conservation and sustainable use of agrobiodiversity;

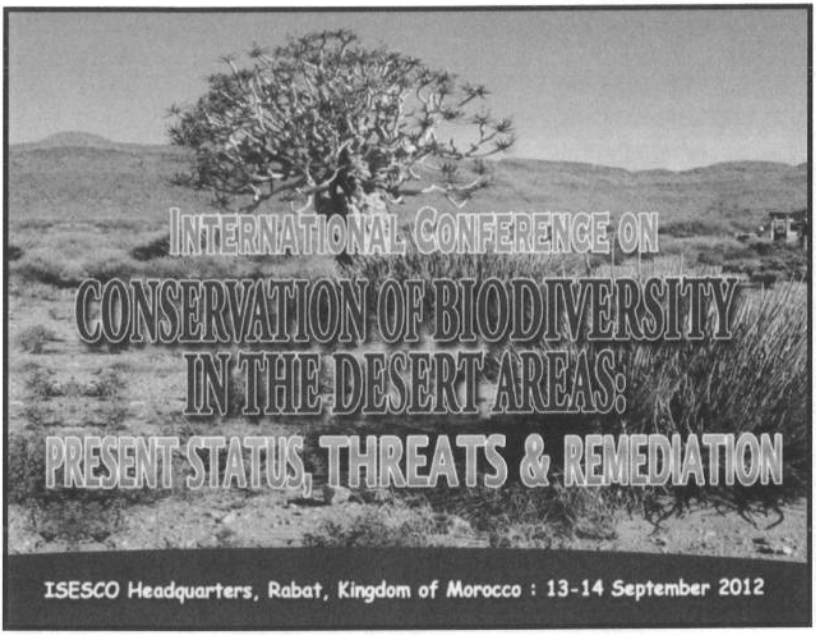

Gap Analysis of H. vulgare subsp. spontaneum (GP1)
N
0 600
kilometers
Accessions
Predicted dist.

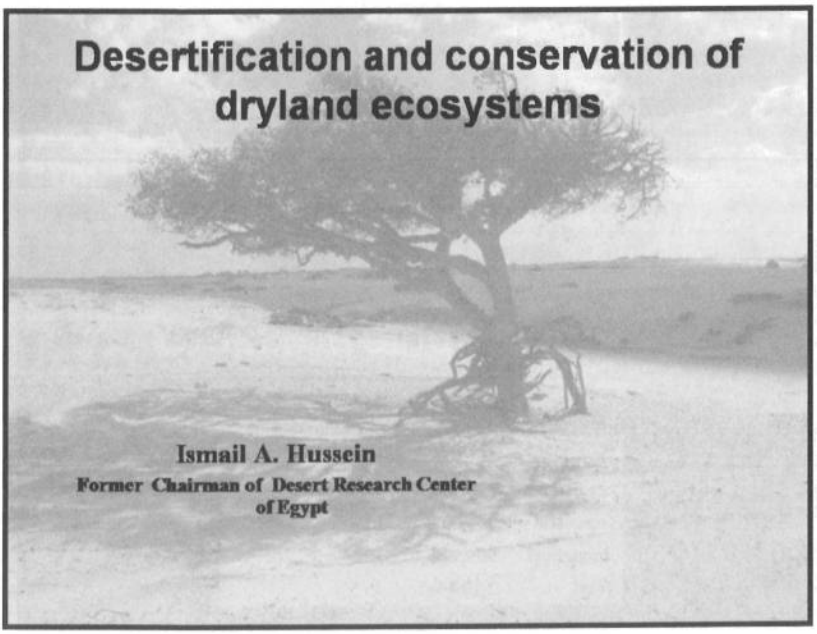

Gap Analysis of H. vulgare subsp. spontaneum (GP1)
N
0 600
kilometers
Accessions
Predicted dist.


Gap Analysis of H. vulgare subsp. spontaneum (GP1)
0
600
Kilometers
Accessions
Predicted dist.


Indigenous breeds of small ruminants characterization and adaptation to harsh conditions and climate


ICARDA
Thank you


INTERNATIONAL CONFERENCE ON
CONSERVATION OF BIODIVERSITY
IN THE DESERT AREAS:
PRESENT STATUS, THREATS & REMEDIATION
ISESCO Headquarters, Rabat, Kingdom of Morocco : 13-14 September 2012


Desertification and conservation of dryland ecosystems
Ismail A. Hussein
Former Chairman of Desert Research Center of Egypt

Dryland Ecosystems

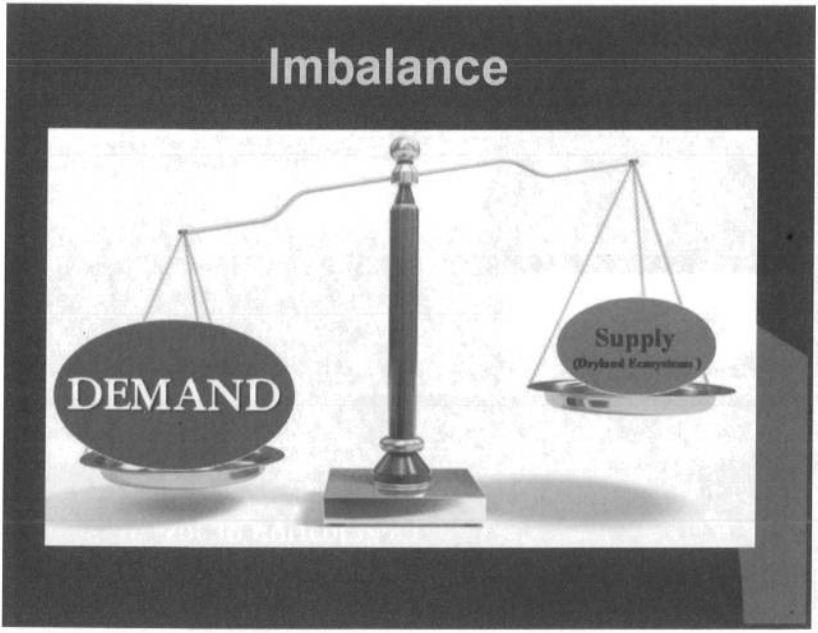
Common Name		%
Desert	Hyper-arid	6.6
Semi- desert	Arid	10.6
Grassland	Semi-arid	15.2
Rangeland	Dry sub-humid	8.7
Total		41.3

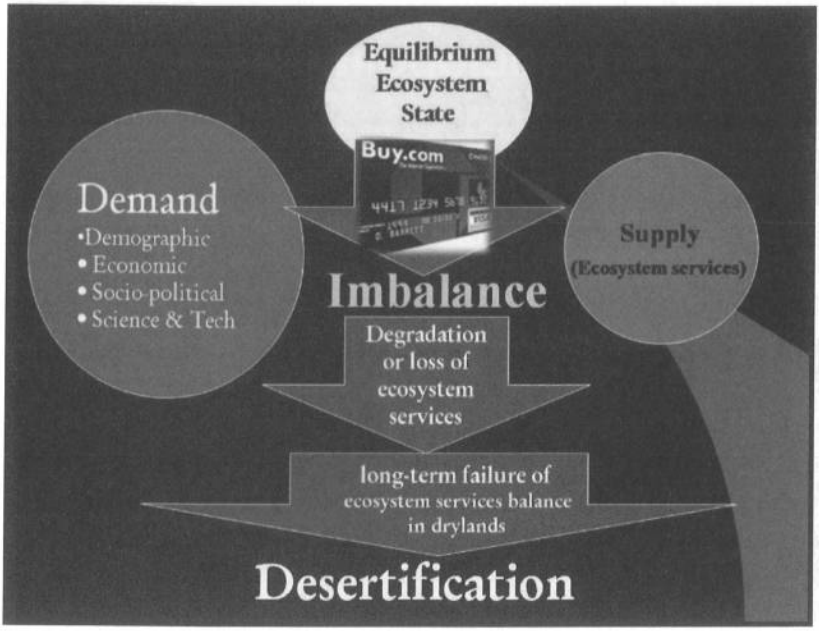
- Land area 41.3%
- Population 38 %
- Up to 44% of all the world's cultivated systems are in the drylands.
- Plant species endemic to the drylands make up 30% of the plants under cultivation today.
- Rangelands support 50% of the world's livestock and are habitats for wildlife.
- Drylands store approximately 46% of the global carbon share. Its soils contain 53% of global soil carbon and its plants 14% of the global biotic carbon.

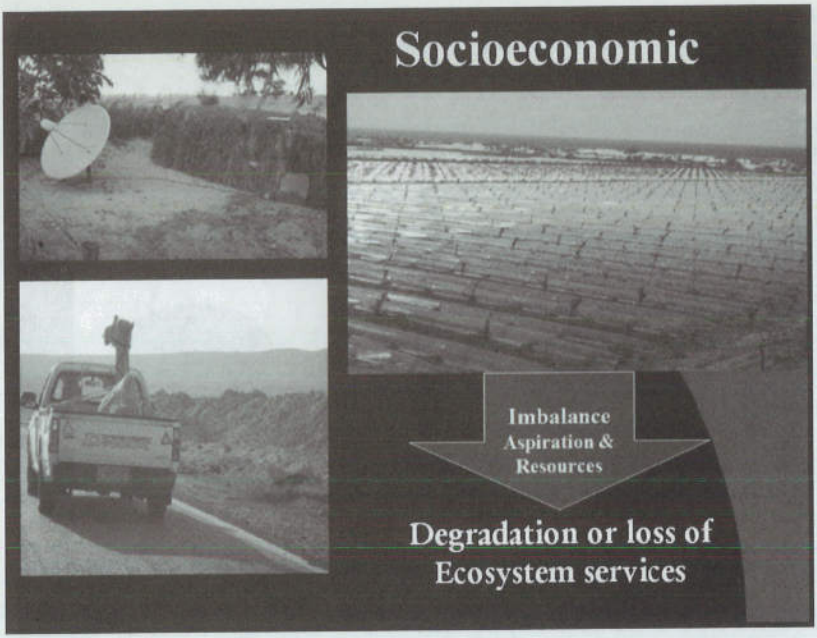
Demand

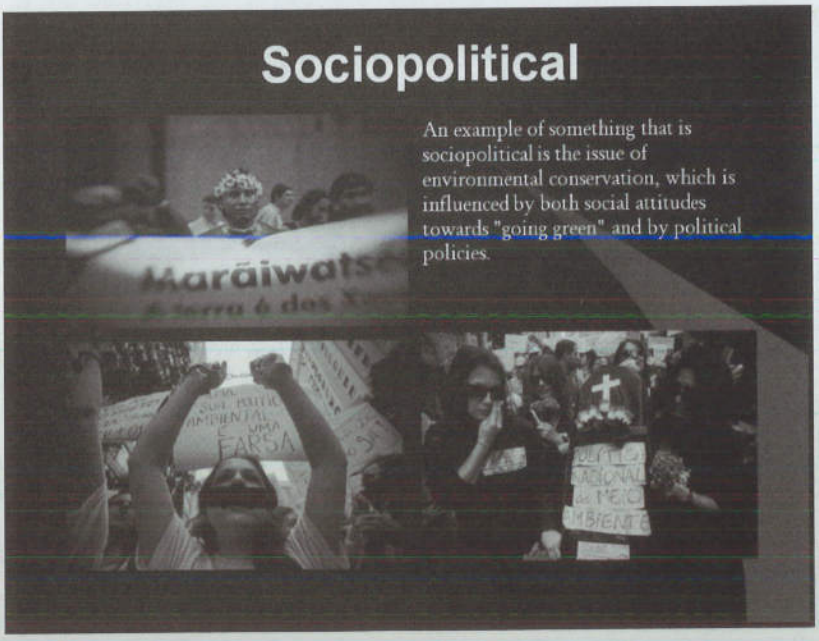
Demographic pressure

Ecosystem	Total Population	Share of global Population %
Desert	101,336	1.7
Semi- desert	242,780	4.1
Grassland	855,333	14.4
Rangeland	909,972	15.3
Total	2,109,421	35.5


Imbalance
DEMAND
Supply
(Dryland Ecosystems)


Equilibrium
Ecosystem
State
Buy.com
Demand
•Demographic
• Economic
• Socio-political
• Science & Tech
Supply
(Ecosystem services)
Imbalance
Degradation
or loss of
ecosystem
services
long-term failure of
ecosystem services balance
in drylands
Desertification


Socioeconomic
Imbalance
Aspiration &
Resources
Degradation or loss of
Ecosystem services


Sociopolitical
An example of something that is sociopolitical is the issue of environmental conservation, which is influenced by both social attitudes towards "going green" and by political policies.

Science and Technology

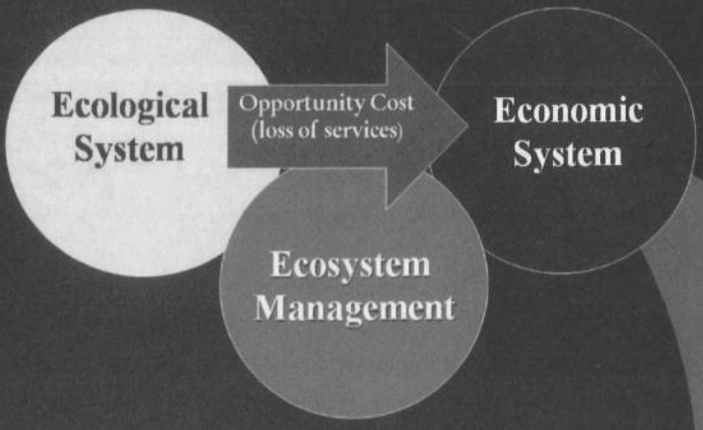
Screening for plants that naturally (genetic potential) possess important characteristics that can help rehabilitate degraded ecosystems in order to challenge problems such as :

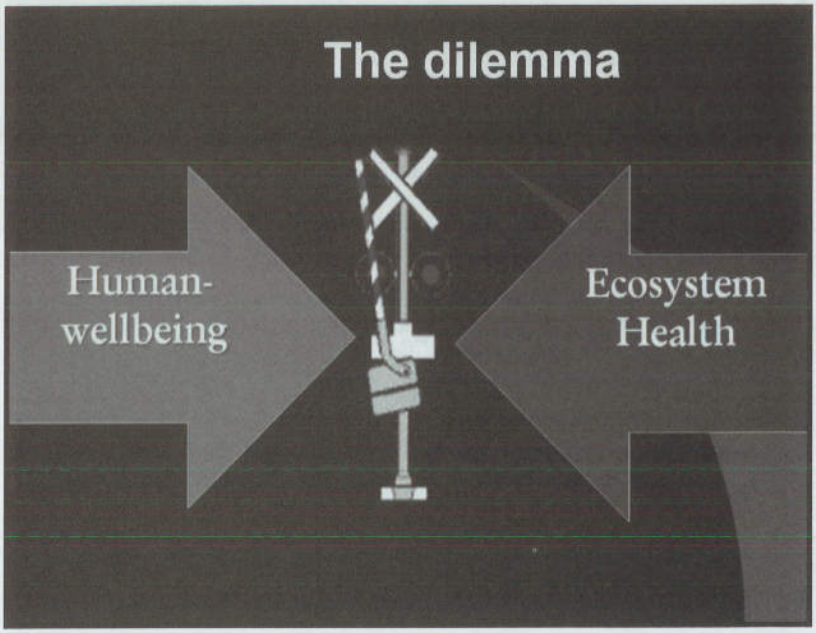
- Heat stress (Global warming)
- Water stress (Water scarcity)
- Soil and Water salinity stress (Water quality degradation)

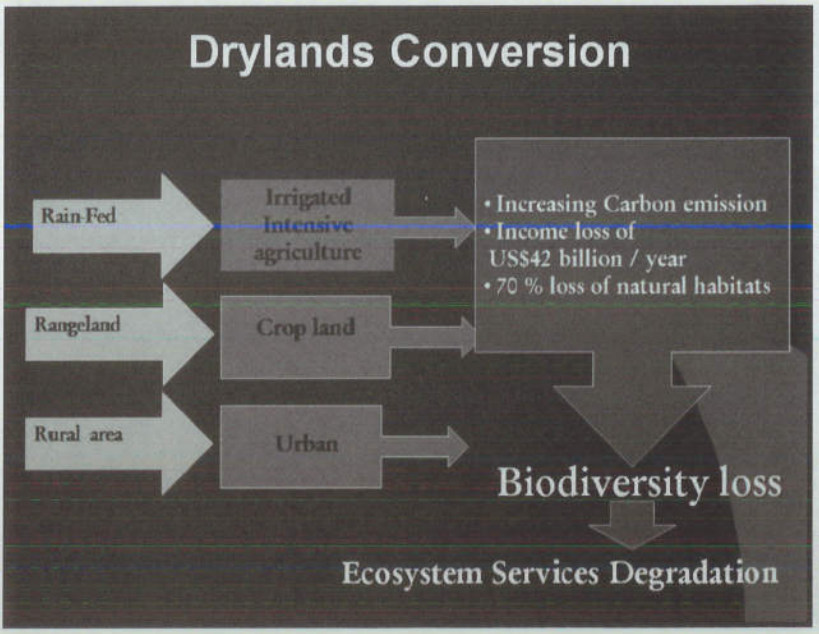
Provide:

- Nutrition value (Food security)
- Economic value (Poverty reduction)

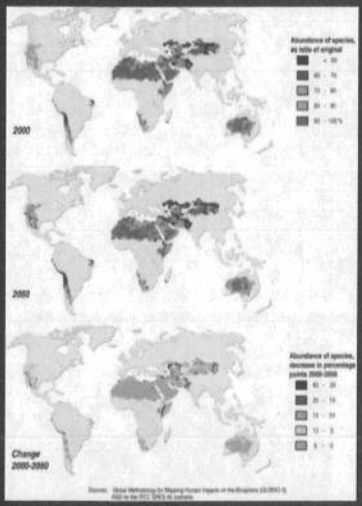
Conversion




The dilemma
Human-wellbeing
Ecosystem Health


Drylands Conversion
Rain-Fed
Rangeland
Rural area
Irrigated Intensive agriculture
Crop land
Urban
• Increasing Carbon emission
• Income loss of US$42 billion / year
• 70 % loss of natural habitats
Biodiversity loss
Ecosystem Services Degradation

Biodiversity loss



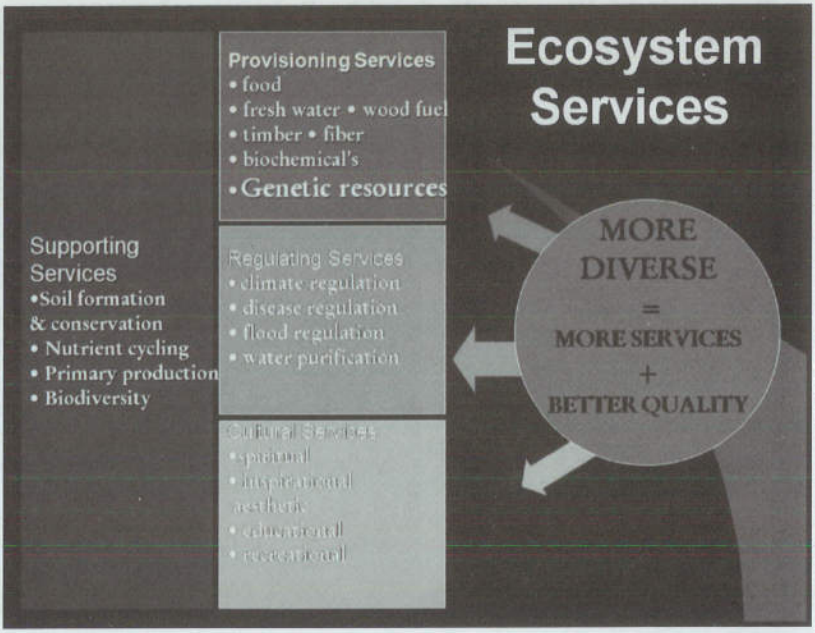
- Estimates indicating that species are heading towards extinction at a rate of about one every 20 minutes.
- The current extinction rate is estimated to be between 1,000 and 10,000 times higher than the natural extinction rate.

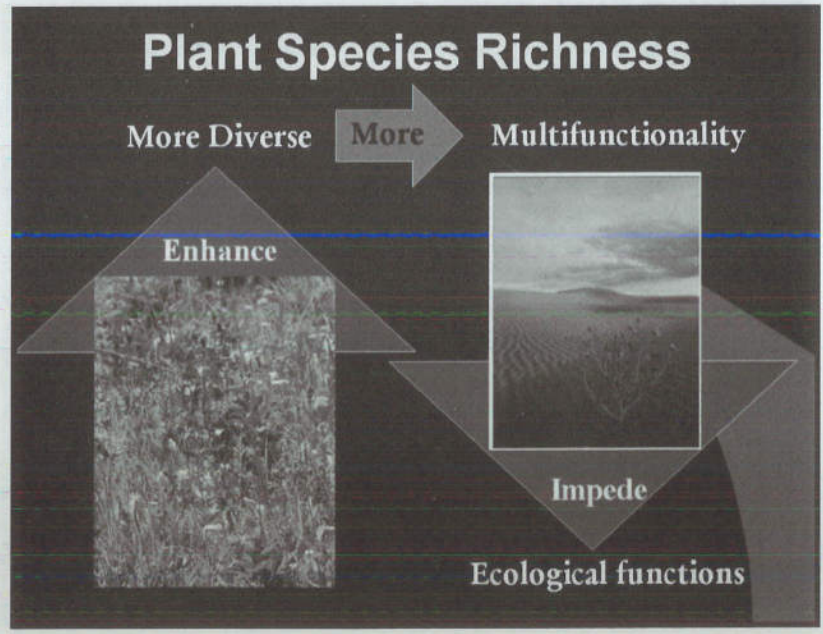
Services Quality

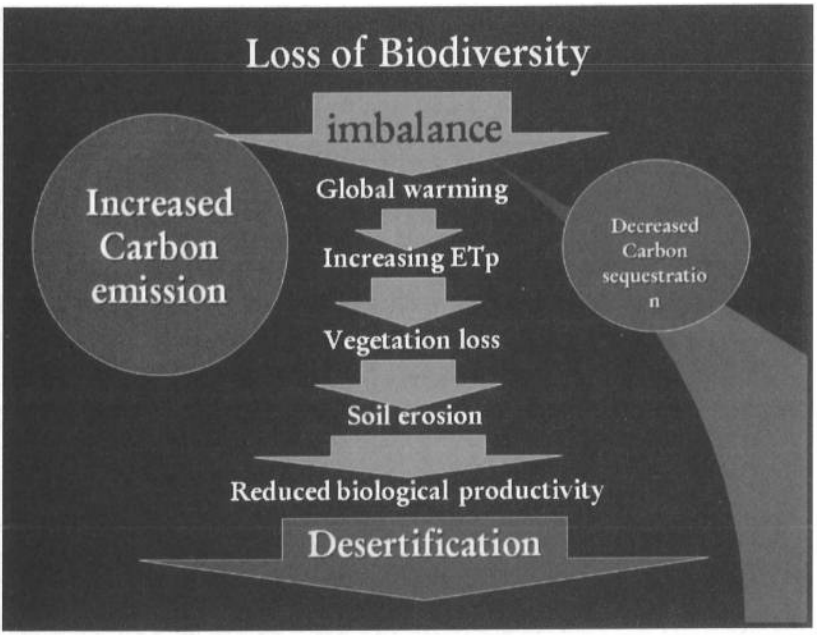
Ecosystem resilience
(Desertification +Climate change)

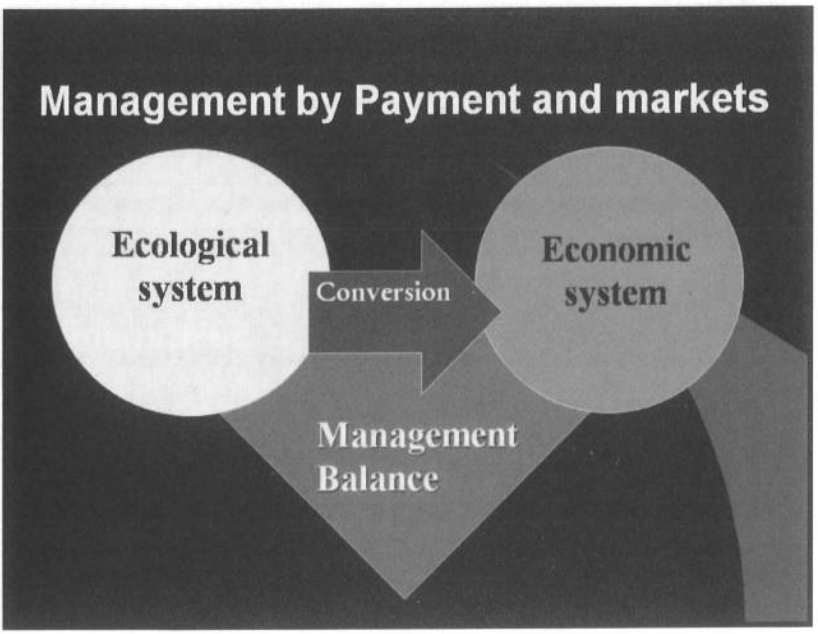
Causes

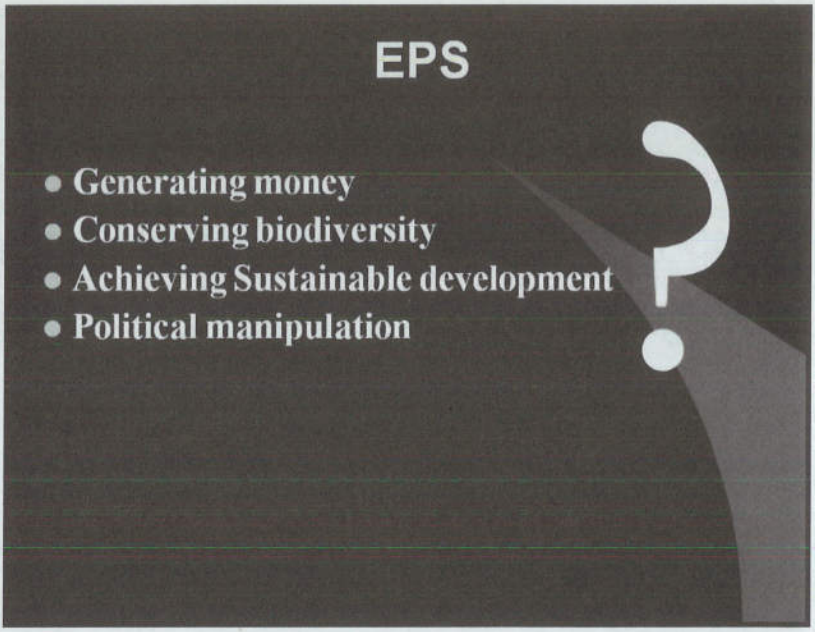
- **Habitat loss** through changes of land use in particular the conversion of natural ecosystems to cropland, continues to be the biggest direct cause of biodiversity loss. Already, more than half of the Earth's 14 terrestrial biomes have had between 20% and 50% of their total area converted to cropland.
- **Unsustainable use of ecosystems and over-exploitation** of biodiversity continue to be major threats. Many species are used by humans to fulfill basic needs.
- **Climate change** is projected to become a progressively more significant threat to biodiversity in the coming decades.
- **Plants, animals and micro-organisms** transported deliberately or accidentally to an area outside their natural geographical ranges can cause great damage to native species.
- **The accumulation of pollution**.

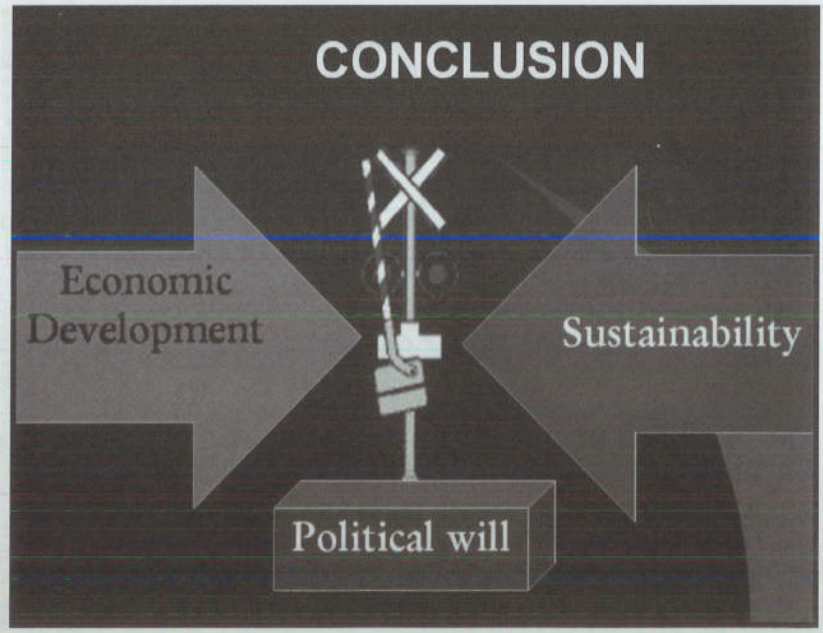

Ecosystem Services
Provisioning Services
• food
• fresh water • wood fuel
• timber • fiber
• biochemical's
• Genetic resources
Supporting Services
•Soil formation & conservation
• Nutrient cycling
• Primary production
• Biodiversity
Regulating Services
• climate regulation
• disease regulation
• flood regulation
• water purification
MORE DIVERSE
=
MORE SERVICES
+
BETTER QUALITY


Plant Species Richness
More Diverse
More
Multifunctionality
Enhance
Impede
Ecological functions


Loss of Biodiversity
imbalance
Increased Carbon emission
Global warming
Increasing ETp
Decreased Carbon sequestratio n
Vegetation loss
Soil erosion
Reduced biological productivity
Desertification


Management by Payment and markets
Ecological system
Conversion
Economic system
Management Balance


EPS
• Generating money
• Conserving biodiversity
• Achieving Sustainable development
• Political manipulation


CONCLUSION
Economic Development
Sustainability
Political will


Thank You..

Development Options to Preserve Biodiversity in the Saharan Coastal Ecosystems

Mohamed Dakki, Abdeljebbar Qninba, Qumnia Himmi,
Mohammed Aziz El Agbani, Mohamed Menioui & Abdellatif Bayed
`Research for Wetland Management` Team,
Scientific Institute, Mohammed V-Agdal University,
Rabat (Morocco)
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The coastal marine ecosystems of Southern Morocco and the adjacent continental band influenced by the ocean, which is 20-40 kilometers large, revealed since long time a great biological richness. Yet, until the 1990s, the preservation of these resources occupied a low place in the practical agenda of the actors in charge of protection of Nature, probably because of the low conservation issues generated by human pressure on natural resources.

However, these issues have quickly arisen during the last twenty years, in the sense that this littoral, as well as other coastal regions of the world, was subject to a fast human occupation, consequently to several factors:

- the increase of the population size, with a pronounced trend to 'littoralisation', both under the pressure of drought crises and the attractiveness of marine natural resources;
- the large tourist influx, which has attracted consequent investment and generated a strong demand in coastal living resources;
- the improvement of the social facilities (water, electricity, connectivity tools, administrative and health services ...);

- the increase of job opportunities, which drew a significant work-forces to this coastal region;

Recent assessments of biodiversity in some ecosystems for which significant data was available prior to 1990 showed a strong regression in species and natural habitats, and even in economic subsistence resources.

Official bodies in charge of the biodiversity inventory and management have tried to anticipate the regression by integrating this littoral area in the Moroccan Master Plan of Protected Areas, developed in 1994-96. Large coastal spaces were then classified as National Parks and/or Wetlands of International Importance (Ramsar Sites). However, this classification has not prevented the biodiversity degradation in these areas, which grow mainly due to the inadequacy of the actions for the space control that managers argue by deficiencies in human and material resources.

Certainly, no one can expect an effective mobilization of actors to protect this biodiversity, if this latter is not integrated into a local and regional development mechanism. In this regard, sustainable tourism is a promising development option, both as source of significant revenue for various types of local actors and as indirect conservation mechanism of biological and cultural diversity. In fact, the Saharan coast contains inexhaustible sustainable tourism resources: diversity of landscapes offered by the ecosystems, originality of artistic and culinary resources (music, poetry ...), archaeological richness (numerous witnesses of ancient human presence), peculiarities of fauna and flora, hospitality of the local communities, etc.

Islamic Educational, Scientific and Cultural Organization

International Conference on Conservation of Biodiversity in the Desert Areas: Present, Status Threats and Remediation
Rabat, 13-14 September 2012

Development options to preserve biodiversity in the Saharan coastal ecosystems

خيارات تنموية للحفاظ على التنوع البيولوجي في النظم الايكولوجية الساحلية الصحراوية

Mohamed Dakki, Abdeljebbar Qninba, Oumnia Himmi, Mohammed Aziz El Agbani, Mohamed Méniousi & Abdellatif Bayed

'Research for Wetland Management' Team, Scientific Institute, Mohammed V-Agdal University, Rabat (Morocco)

محمد داكي، عبد الجبار قنيبة، أمنية جمّي، محمد عزيز العگباني، محمد منيوي وعبد اللطيف بيض

فريق البحث من أجل تدبير المناطق الرطبة، المعهد العلمي، جامعة محمد الخامس-أگدال، الرباط (المغرب)

Content

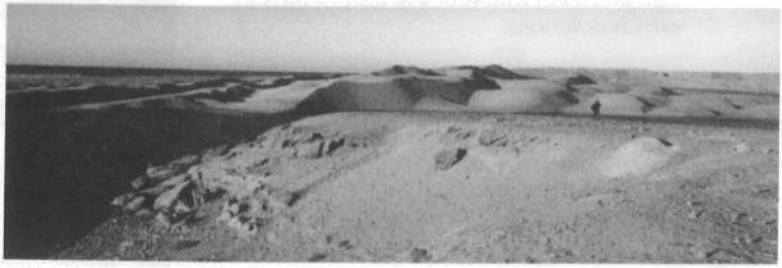
Area concerned

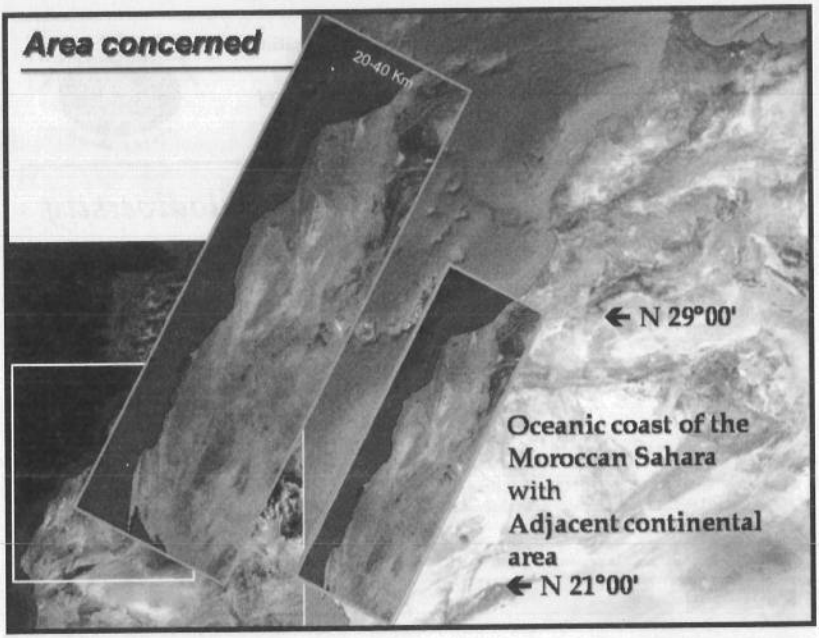
Overview of Biological Diversity

of Biodiversity Loss

of Conservation Measures (protected areas)

Sustainable tourism : a conservation alternative





Area concerned

Geology: coastal area composed with tertiary and quaternary formations, covering horizontal Cretaceous chalk plateaus, which are limited on the continental side by the Precambrian and Primary African 'Craton'.

Oro-hydrography: coastal landscapes dominated by plateaus with different altitudes (60-300m, rarely over 500 m), and frequently interrup-ted by *large valleys* or *sebkhas* more or less deep, with some *sand dune systems*.

Climate: Precipitation rare and irregular (<60 mm), but with high atmospheric humidity (60-80% on the coast) and relatively low temperatures (16-25°C near the coast), wind frequently strong and charged with sand.

Rich biological diversity

Introduction

This **richness** will not be illustrated through exhaustive inventories, but only through a survey of

- diversity of ***habitats/ecosystems***
- diversity of a significant living group (***Vertebrates***)

The **originalities** of this biodiversity are mainly related to

- ***actual factors***, mainly the Saharan climate
- ***history of the region*** in the context of the Sahara expansion

Rich biological diversity

Habitats/Ecosystems diversity

Marine (Coastal)

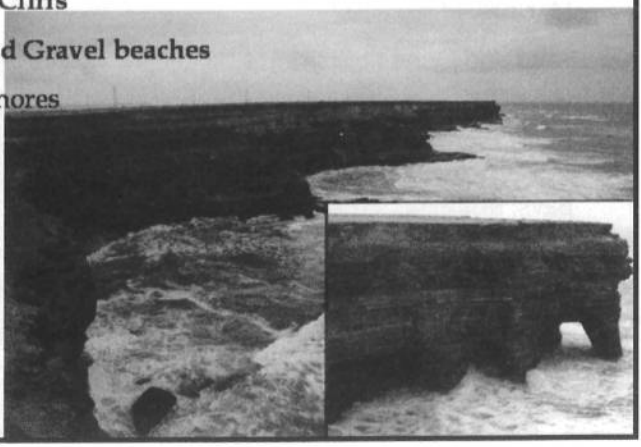
Marine Cliffs

Sand and Gravel beaches

Rocky shores

Biolog

Bays



Rich biological diversity

Habitats/Ecosystems diversity

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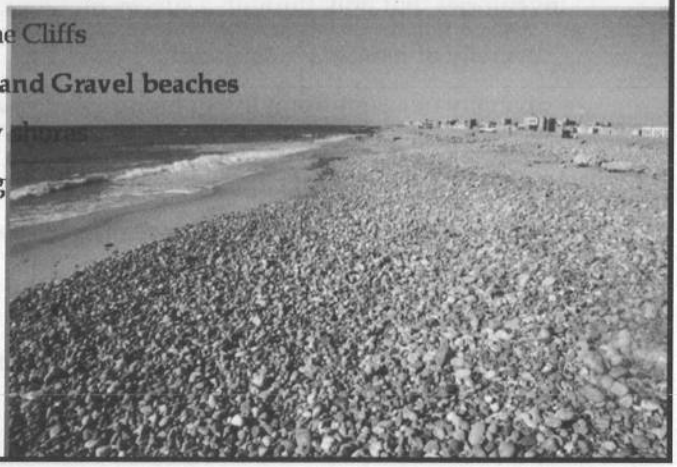


Rich biological diversity

Habitats/Ecosystems diversity

Marine (Coastal)

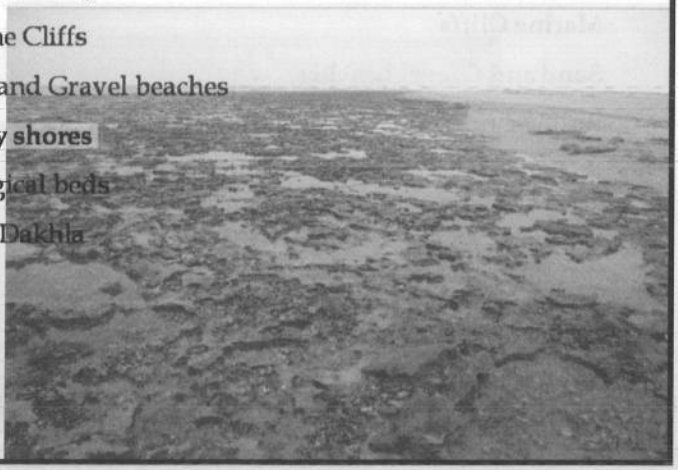
Marine Cliffs

Sand and Gravel beaches

Rocky shores

Biological beds

Bays: Dakhla



Rich biological diversity

Habitats/Ecosystems diversity

Marine (Coastal)

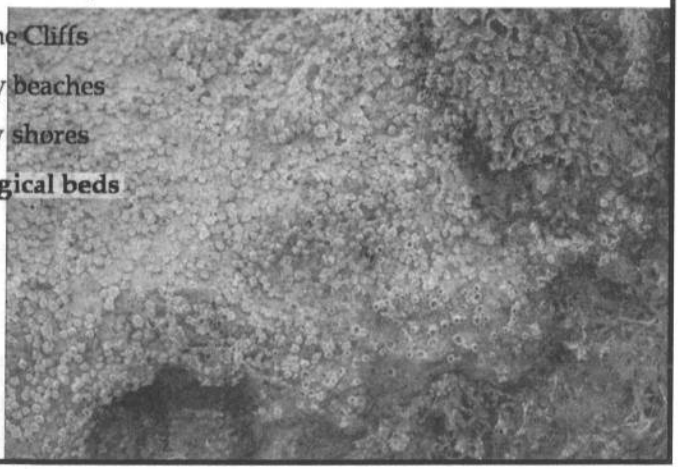
Marine Cliffs

Sandy beaches

Rocky shores

Biological beds

Bays



Rich biological diversity

Habitats/Ecosystems diversity

Marine (Coastal)

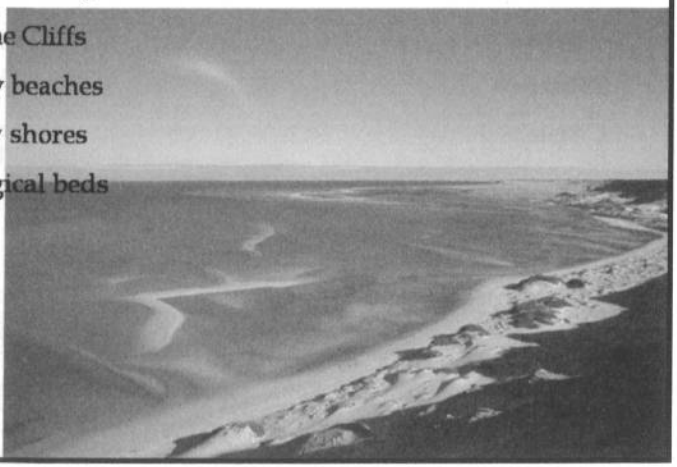
Marine Cliffs

Sandy beaches

Rocky shores

Biological beds

Bays



Rich biological diversity

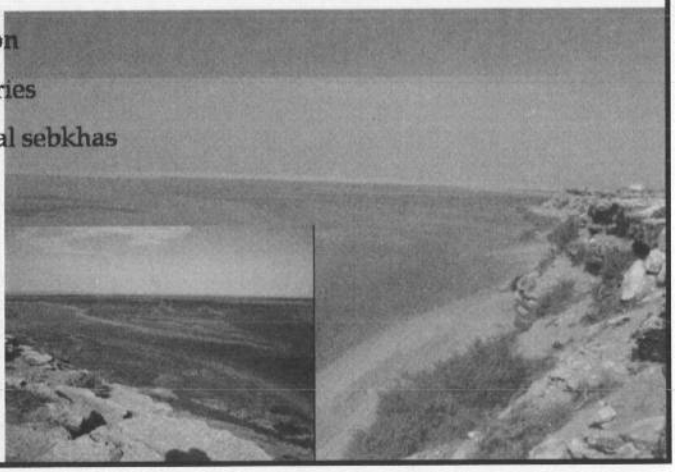
Habitats/Ecosystems diversity

Estuarine

Lagoon

Estuaries

Coastal sebkhas



Rich biological diversity

Habitats/Ecosystems diversity

Estuarine

Lagoon

Estuaries

Coastal sebkhas

Rich biological diversity

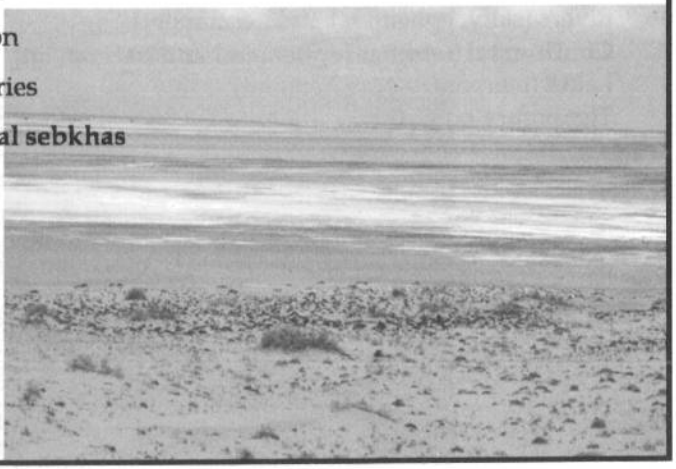
Habitats/Ecosystems diversity

Estuarine

Lagoon

Estuaries

Coastal sebkhas



Rich biological diversity

Habitats/Ecosystems diversity

Inland waters

Rivers (salty, ephemeral to permanent)

Continental Sebkhas (ephemeral and permanent)

Lakes (temporary or ephemeral)

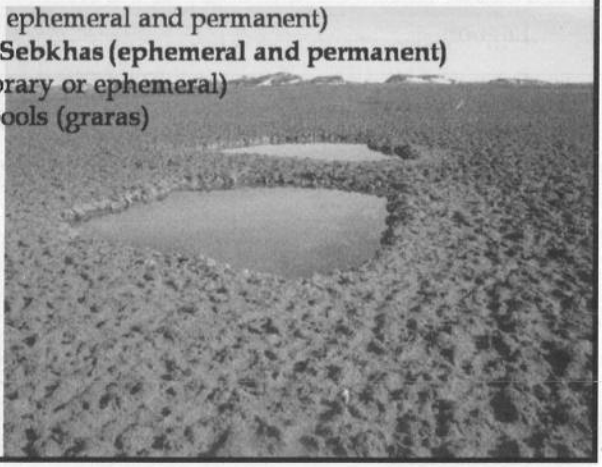
Temporary pools (graras)

Rich biological diversity

Habitats/Ecosystems diversity

Inland waters

Rivers (salty, ephemeral and permanent)
Continental Sebkhas (ephemeral and permanent)
Lakes (temporary or ephemeral)
Temporary pools (graras)



Rich biological diversity

Habitats/Ecosystems diversity

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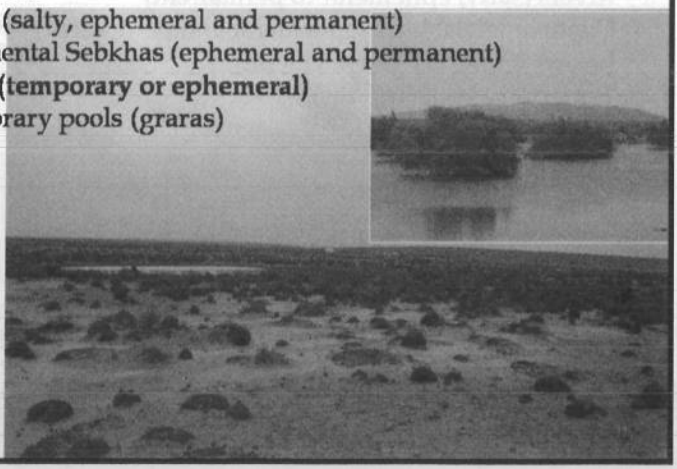


Rich biological diversity

Habitats/Ecosystems diversity

Inland waters

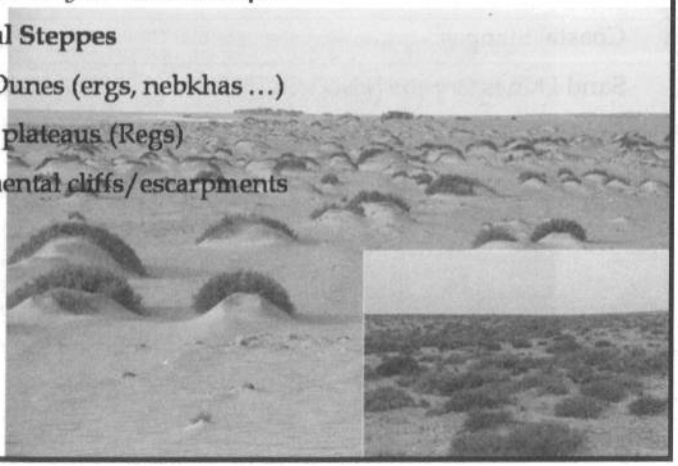
Rivers (salty, ephemeral and permanent)
Sebkhas (ephemeral and permanent)
Lakes (temporary or ephemeral)
Temporary 'pools' (graras)

Rich biological diversity

Habitats/Ecosystems diversity

Terrestrial ecosystems/landscapes

Coastal Steppes
Sand Dunes (ergs, nebkhas ...)
Rocky plateaus (Regs)
Continental cliffs/escarpments



Rich biological diversity

Habitats/Ecosystems diversity

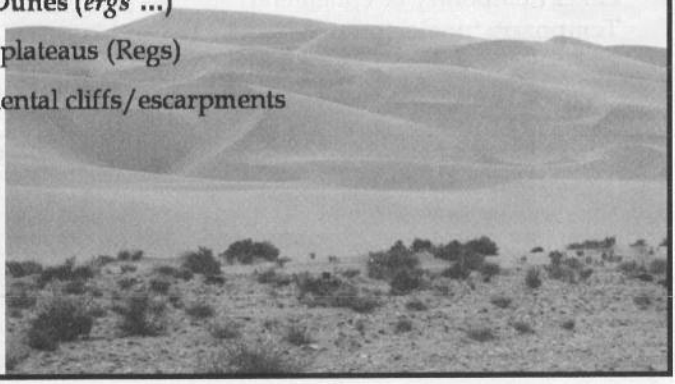
Terrestrial ecosystems/landscapes

Coastal Steppes

Sand Dunes (*ergs* ...)

Rocky plateaus (Regs)

Continental cliffs/escarpments



Rich biological diversity

Habitats/Ecosystems diversity

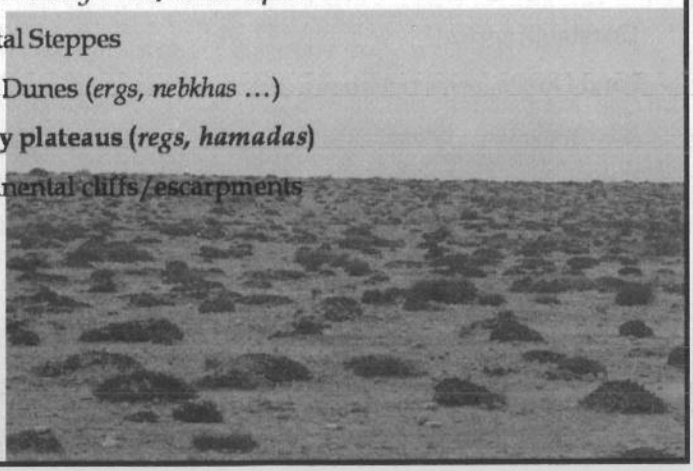
Terrestrial ecosystems/landscapes

Coastal Steppes

Sand Dunes (*ergs, nebkhas* ...)

Rocky plateaus (*regs, hamadas*)

Continental cliffs/escarpments



Rich biological diversity

Habitats/Ecosystems diversity

Terrestrial ecosystems/landscapes

Coastal Steppes

Sand Dunes (*ergs, nebkhas* ...)

Rocky plateaus (*regs*)

Continental cliffs/escarpments

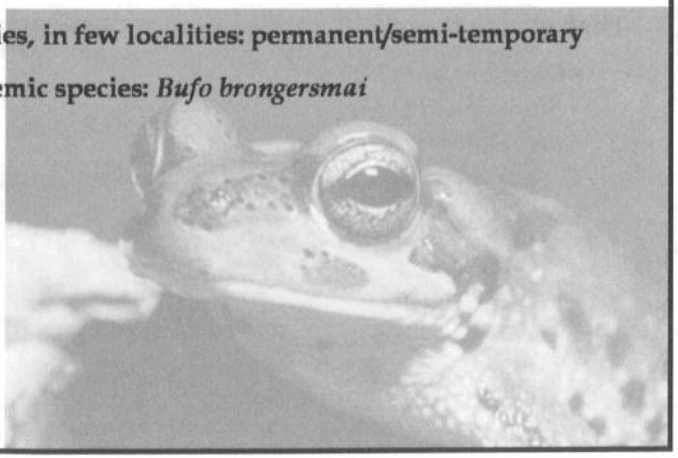
Rich biological diversity

Vertebrates: various originalities

Amphibians

4 species, in few localities: permanent/semi-temporary

1 Endemic species: *Bufo brongersmai*



Rich biological diversity

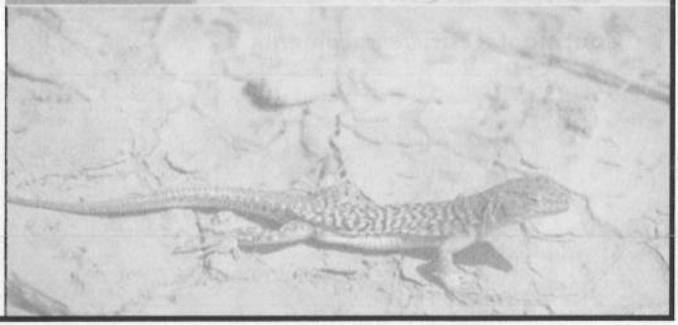
Vertebrates: various originalities

Reptiles

High diversity (high resistance to low air humidity)

Some species specific to the desert habitats

Frequent observations of marine Turtles



Rich biological diversity

Vertebrates: various originalities

Birds

High global diversity (both Nesters and Visitors)

- ***Diversity of habitats***
- ***Situation of the region on major migration routes***

Rich biological diversity

Vertebrates: various originalities

Birds

Coastal communities mainly composed with migrants

Terrestrial communities with low diversity and abundances

Some endemic forms both in coastal and continental habitats

Rich biological diversity

Vertebrates: various originalities

Mammals

More than fifty species at the beginning of the 1900s

Dominance of the savannah species and rodents

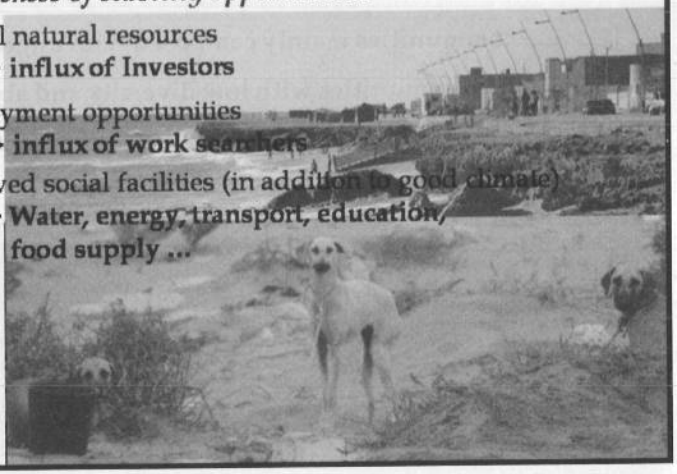
Continual decrease both in diversity and abundance

Recent increase of Biodiversity Loss

Causes: Fast human expansion along the Saharan littoral

Attractiveness of stability opportunities

- Coastal natural resources
  => **influx of Investors**
- Employment opportunities
  => **influx of work searchers**
- Improved social facilities (in addition to good climate)
  => **Water, energy, transport, education, food supply ...**

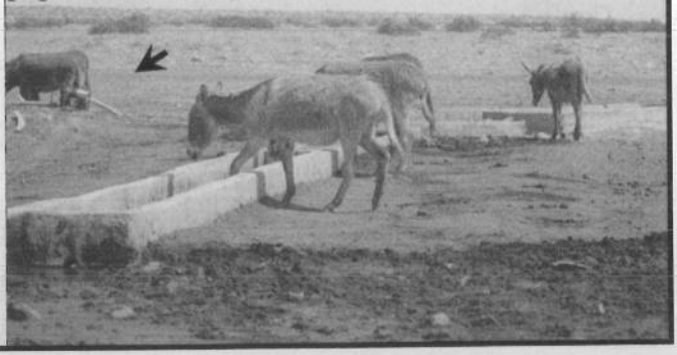


Recent increase of Biodiversity Loss

Causes: Fast human expansion along the Saharan littoral

Pressure of recurrent Drought crises

Lack of water resources and Degradation of the vegetation cover (as pasture resources) of the inland rocky plateaus
=> **population moving towards the Coast**



Recent increase of Biodiversity Loss

Some significant examples

Threats on Natural habitats (punctual but in progress)

- Degradation of the *Reg's* habitats (overgrazing, roads ...)
- Transformation of Estuaries to Tourism complexes
- River pollution (La'youne, Tantan ...)
- Running waters blocked (Dr'a, Assaquia Al Hamra ...)
- Temporary lakes and *Graras* rarely flooded (Tarfaya region)
- Increasing of mechanical salt exploitation in sebkhas
- Vegetation cutting, etc.

Recent increase of Biodiversity Loss

Some significant examples

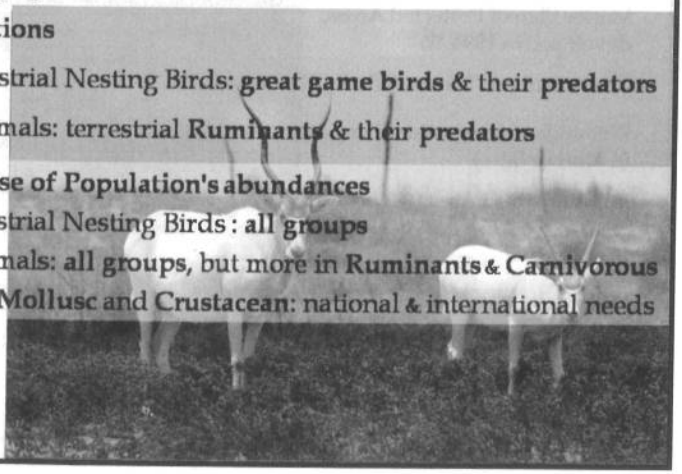
Species/populations loss

Extinctions

- Terrestrial Nesting Birds: **great game birds** & their **predators**
- Mammals: terrestrial **Ruminants** & their **predators**

Decrease of Population's abundances

- Terrestrial Nesting Birds : **all groups**
- Mammals: **all groups**, but more in **Ruminants** & **Carnivorous**
- **Fish, Mollusc** and **Crustacean**: national & international needs

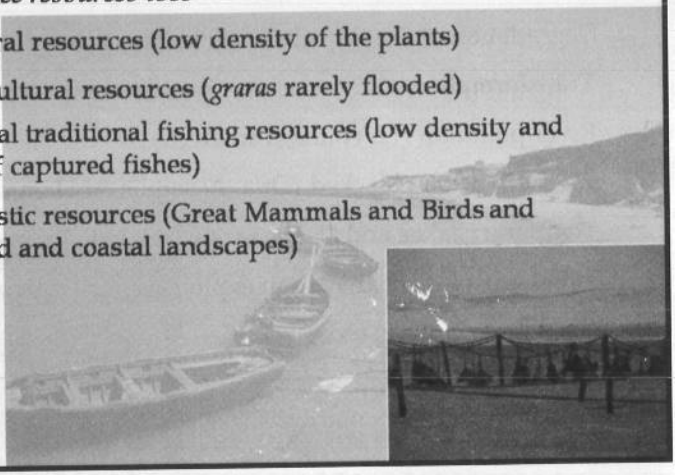


Recent increase of Biodiversity Loss

Some significant examples

Subsistence resources loss

- Pastoral resources (low density of the plants)
- Agricultural resources (*graras* rarely flooded)
- Coastal traditional fishing resources (low density and size of captured fishes)
- Touristic resources (Great Mammals and Birds and inland and coastal landscapes)
- etc.



Conservation Measures (designation of Protected Areas)

Appreciable Biodiversity Inventories for Conservation

Four official inventories

- Master Plan of Protected Areas, developed in 1994-96
- Creation of one National Park (Khnifiss)
- Wetlands of International Importance (4 Ramsar Sites)
- Important Bird Areas (4 sites)

But

- ***Loss of Biodiversity is a continuous process***
- ***Optimism in effective mobilization of 'protectors' is low***
- ***Misunderstanding about the Conservation concepts between the developers and protectors, generating frequent oppositions***

Sustainable tourism: a conservation alternative

Sustainable Tourism = Indirect opportunity for conservation

Conservation targets = development targets

- Cultural patrimonies are mainly common touristic resources
- Living components of the ecosystems are also potentially attractive of tourists (local, national & international origins) and may be protected as touristic resources

ST is adopted in the MPPA as a privileged conservation option

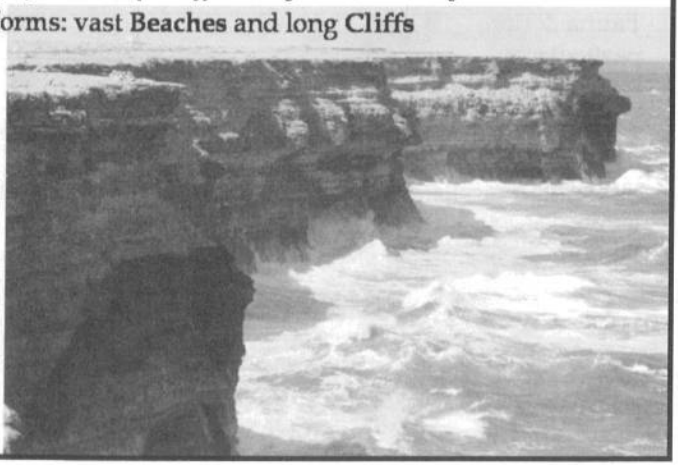
- **Landscapes** and **Cultural patrimony** have been used as major **criteria** in the identification process of protected areas
- ST is a **potential source of revenue** for various local habitants
- ST generates **better participation (or less opposition)** of the local population to the administrative management decisions

Sustainable tourism: a conservation alternative

Various local Tourism resources

Diversity of landscapes offered by several ecosystems

- Costal forms: vast **Beaches** and long **Cliffs**



Sustainable tourism: a conservation alternative

Various local Tourism resources

Diversity of landscapes offered by several ecosystems

- Coastal and estuarine systems, with contrasting colors/forms (water, dunes, sky, vegetation ...)

Sustainable tourism: a conservation alternative

Various local Tourism resources

Diversity of landscapes offered by several ecosystems

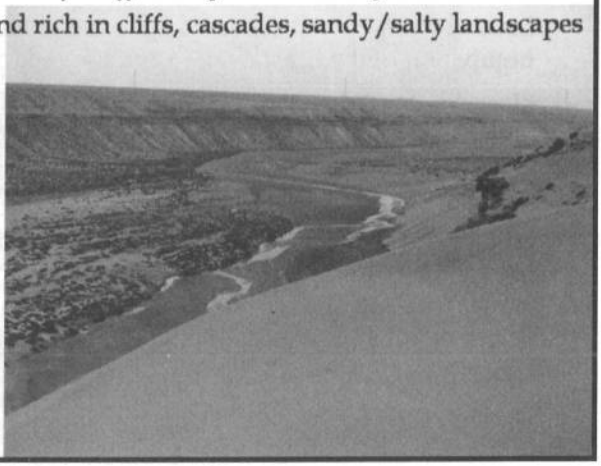
- Fauna & flora particular and participate to the esthetic quality of some landscapes (estuaries, cliffs, lagoons, ...)

Sustainable tourism: a conservation alternative

Various local Tourism resources

Diversity of landscapes offered by several ecosystems

- Rivers large and rich in cliffs, cascades, sandy/salty landscapes

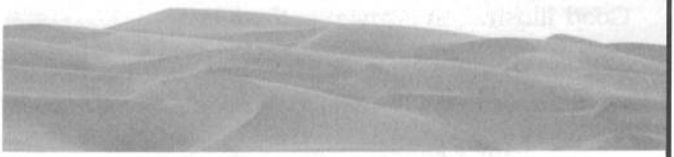


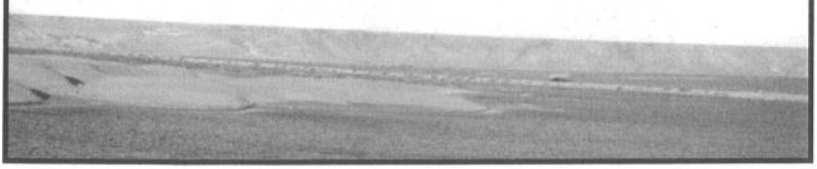
Sustainable tourism: a conservation alternative

Various local Tourism resources

Diversity of landscapes offered by several ecosystems

- Erg (sand dunes) systems, typical with various forms and the most expanded in Morocco



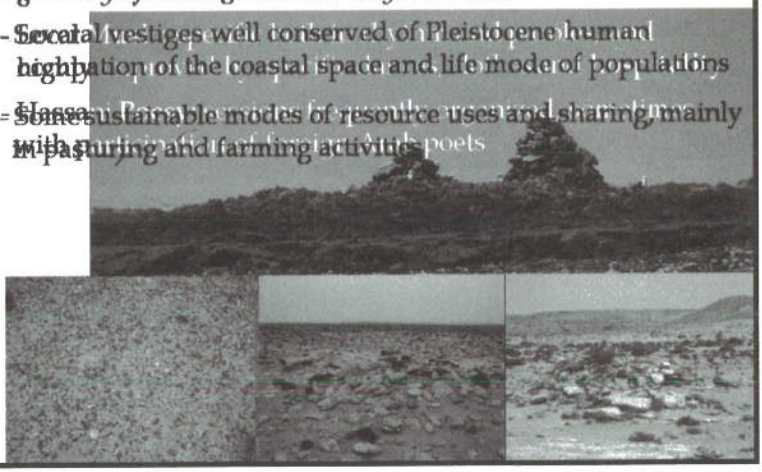


Sustainable tourism: a conservation alternative

Various local Tourism resources

Originality of the local cultural and ethnic resources

- Several vestiges well conserved of Pleistocene human habitation of the coastal space and life mode of populations
- Some sustainable modes of resource uses and sharing, mainly in pasturing and farming activities



Sustainable tourism: a conservation alternative

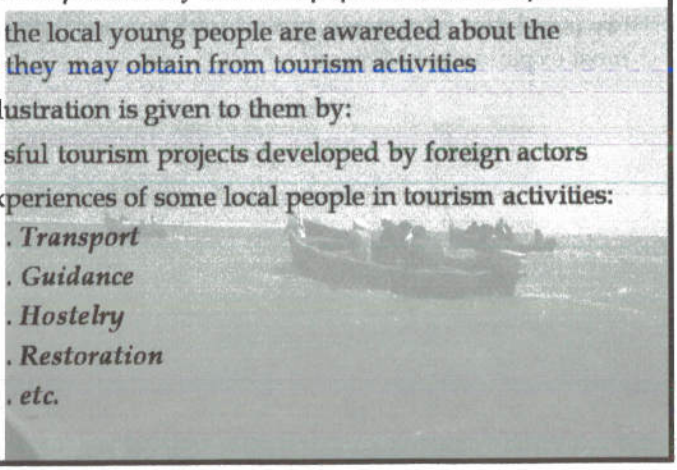
Various local Tourism resources

Relative predisposition of the local population to adopt ST

Most of the local young people are awareded about the benefits they may obtain from tourism activities

Good illustration is given to them by:

- Succes sful tourism projects developed by foreign actors
- Few experiences of some local people in tourism activities:
  - *Transport*
  - *Guidance*
  - *Hostelry*
  - *Restoration*
  - *etc.*



Sustainable tourism: a conservation alternative

Needs to develop local tourism employments

Support in several ways

Specific knowledge in :

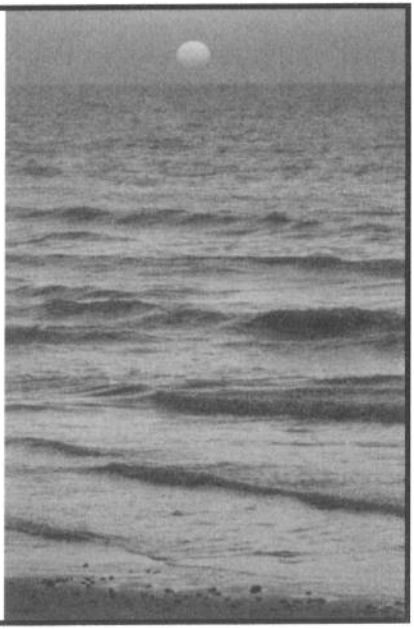
. Natural and Cultural tourism resources
. How to develop tourism resources
. How to develop 'Traditional hostelry' (bivouac ...)
. Restoration (health conditions, originality of food ...)
. Field trip organization (transport, guidance, animation ...)
. Tools and mechanisms to drain and receive tourists
. Foreign languages, etc.

Support (financial/technical) to

. Conceive and realize projects
. Starting Exploitation (accompaniment) of projects

شـكـراً
علـى انتبـاهكـم

Thank you
for your attention



Nexus of Biodiversity Loss in Desert Ecosystems, Metagenomics and Emerging Infectious Diseases

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Department of Biotechnology,
Quaid-i-Azam University, Islamabad
E-mail: shinwari2008@gmail.com

Ecosystems with reduced biodiversity are less able to provide the ecosystem services—such as carbon sequestration, nutrient cycling and resistance to drought—on which humans rely. Current unprecedented declines in biodiversity reduce the ability of ecological communities to provide many fundamental ecosystem services. Reduced biodiversity affects the transmission of infectious diseases of humans, other animals and plants.

We are losing biodiversity through several factors ranging from global warming, climate change, human pressure, demand for food, medicine etc. In today's world, most extinction will occur before the species even have been named and described, much less known ecologically

Normally with biodiversity loss researchers mainly focus on higher organisms. But in present study we will discuss it from microgoranisms point of view. First, the biodiversity losses are causing emergences of infectious diseases (EIDs) which are making them more virulent than the past. But if we have to point out three major reasons then, Biodiversity loss on larger or smaller scales and even extinction of species is caused, Emerging Infectious Diseases (EIDs), global warming, and invasiveness of species.

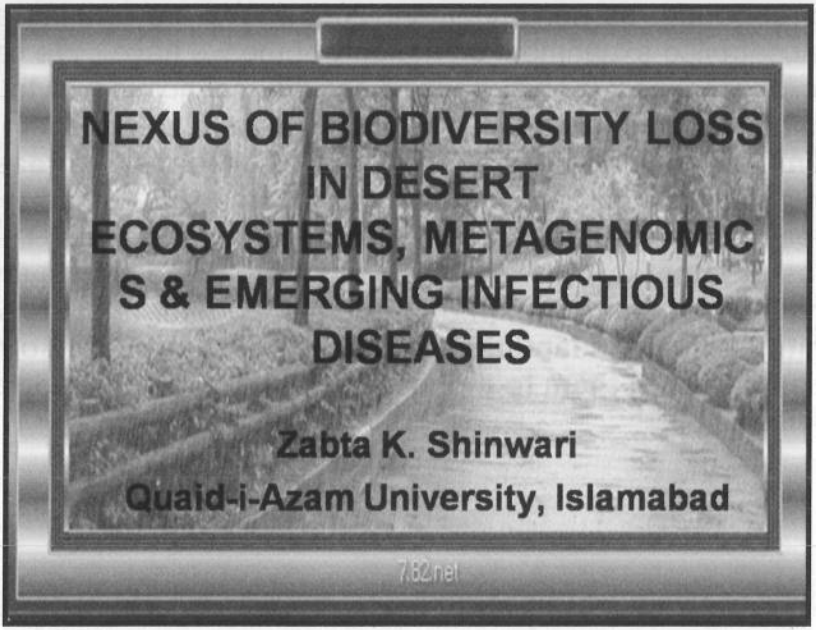
There are various levels of biodiversity based on genetic, microbial, vector species, host species, community, and habitat structures. Changes in any of these will cause changes

in gene frequencies both in host – pathogens, microbial communities composition within host, vectors, or outside environment, as well as structure, composition, and diversity of vegetations. Loss in a single species can impact genetic, microbial communities, vector species, host species, community, and habitat structures.

Researchers conclude that the pests and diseases incidence are not necessarily decreased by vegetation diversifications. Some of the pests have the capabilities to use wider ranges of hosts as well as several other mechanisms to reduce pests had also limitations which suggest further detailed studies on mechanisms.

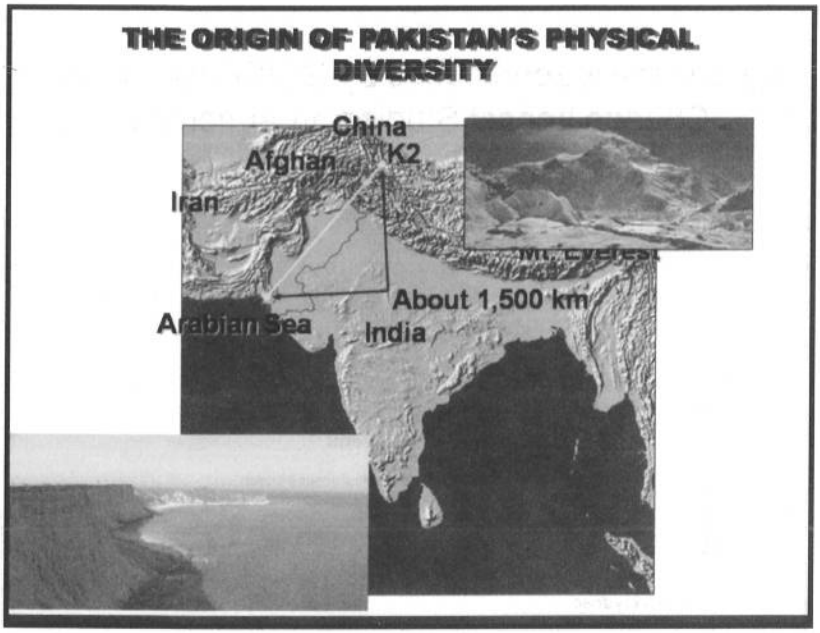
The current article reviews the biodiversity losses and emerging infectious diseases at various levels reported by recent literature which will help in current status of EIDs and future. We will also discuss role of metagenomics which provides us assess to the uncultured (>99% bacteria) and its contribution in the development of local economy. Using modern technology, these unknown extremophils (in deserts) can be used for reducing poverty in areas of high population growth rate like in tropical and sub-tropical Asia, Africa and South America. These are the regions of greatest need of economic development, and the twin pressures of population growth and economic expansion can only increase the demands of biological resources. Application of techniques to the study of communities of microbial organisms directly in their natural environments, by passing the need for isolation and lab cultivation of individual species. We can search for new antibiotics, role of human gut microbes (microbiome) in nutrition and obesity, can be applied in Bioindustry: discovery of novel enzymatic activities (ex. enzymes specialised in lignocellulose degradation in termite guts) or Environment: Biosensors, bioremediation of contaminated soils, industrial treatment of wastewater.

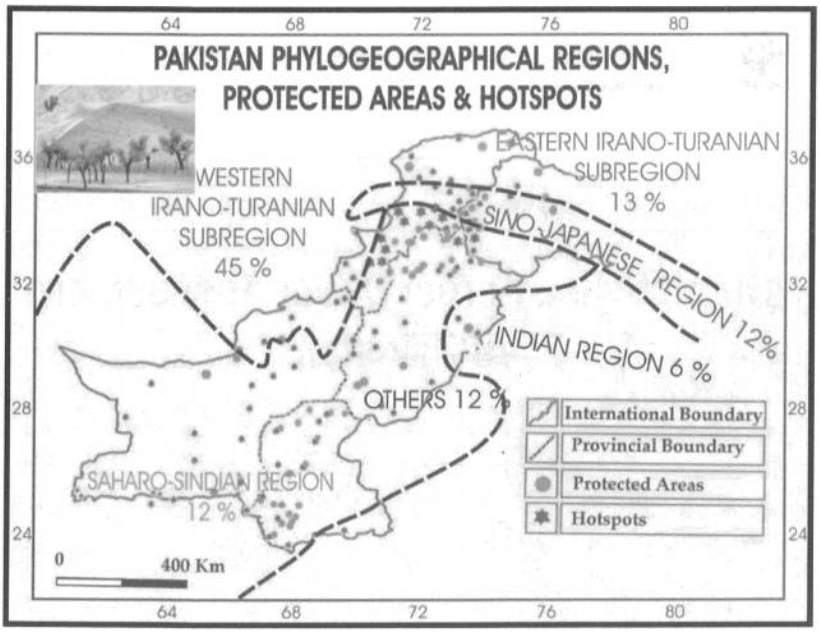
To conclude, as per Friedman(2008), "We are running an uncontrolled experiment on the only home we have". We can no longer expect to enjoy peace & security, economic growth, & human rights, if we continue to ignore key problems of energy-climate Era. Because this has already resulted in a**n increase in extreme weather events: floods, droughts, cyclones, Sea level rise, flooding low-lying areas and islands. This has greatest impact on the poor and now we are having millions of environmental refugees and high costs of mitigation and adaptation. These refugees brought some diseases with them to the urban which were not reported before.**



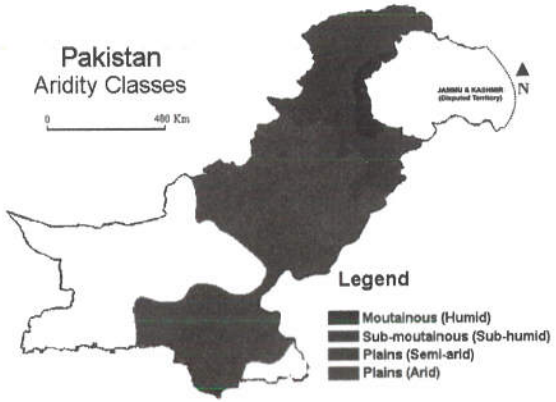
Contents

- Pakistan climate & Habitat
- Introduction of Biodiversity loss
  - Use of Biotechnology in measuring its impact
- Bioidviersity loss & Emerging Infectious diseases (EID) nexus
- Metagenomics & Endophytic Microbes
  - Its importance in Applied Biotechnology


THE ORIGIN OF PAKISTAN'S PHYSICAL DIVERSITY
China
Afghan
K2
Iran
About 1,500 km
Arabian Sea
India

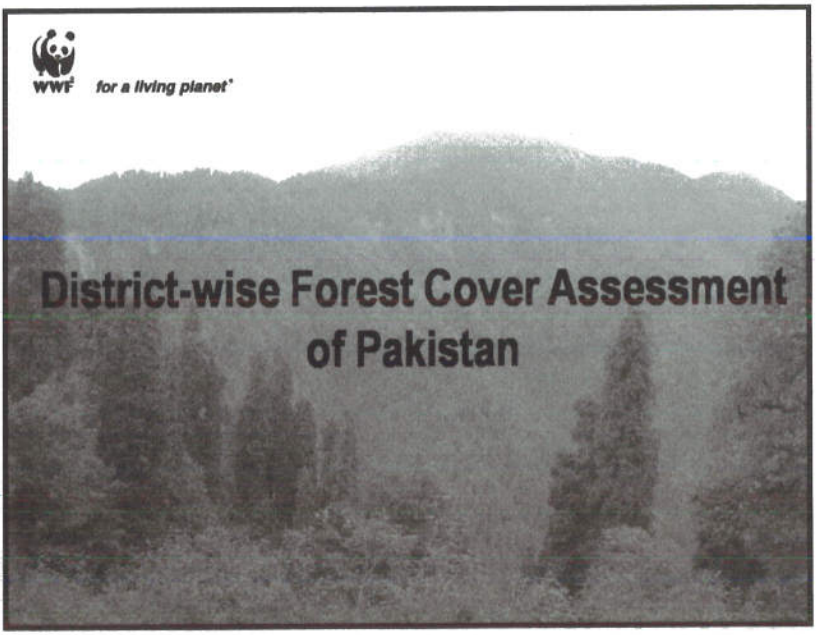

PAKISTAN PHYLOGEOGRAPHICAL REGIONS, PROTECTED AREAS & HOTSPOTS
64
68
72
76
80
36
32
28
24
WESTERN IRANO-TURANIAN SUBREGION 45 %
EASTERN IRANO-TURANIAN SUBREGION 13 %
SINO-JAPANESE REGION 12%
INDIAN REGION 6 %
OTHERS 12 %
SAHARO-SINDIAN REGION 12 %
International Boundary
Provincial Boundary
Protected Areas
Hotspots
0
400 Km

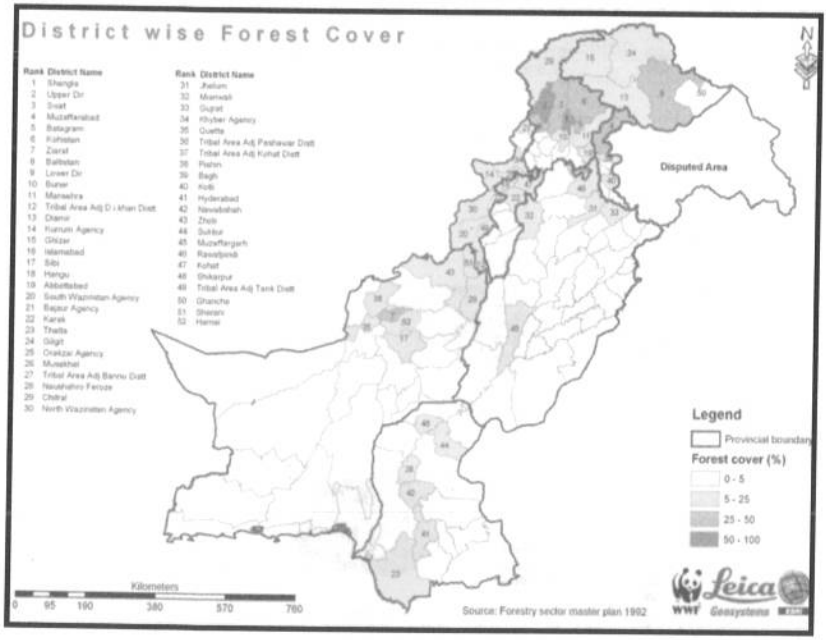
Agro-climatic zones used by GCISC for Climate Change Impact Studies on Agriculture

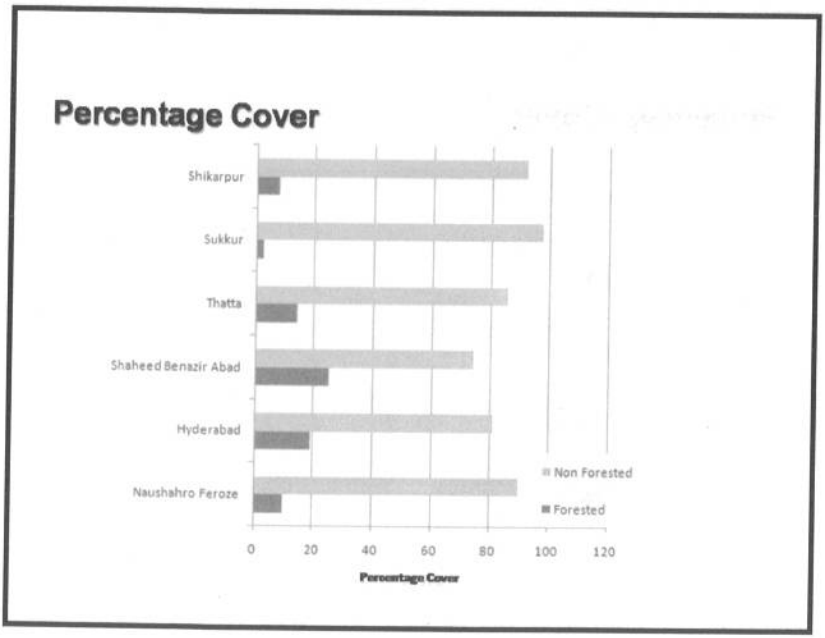


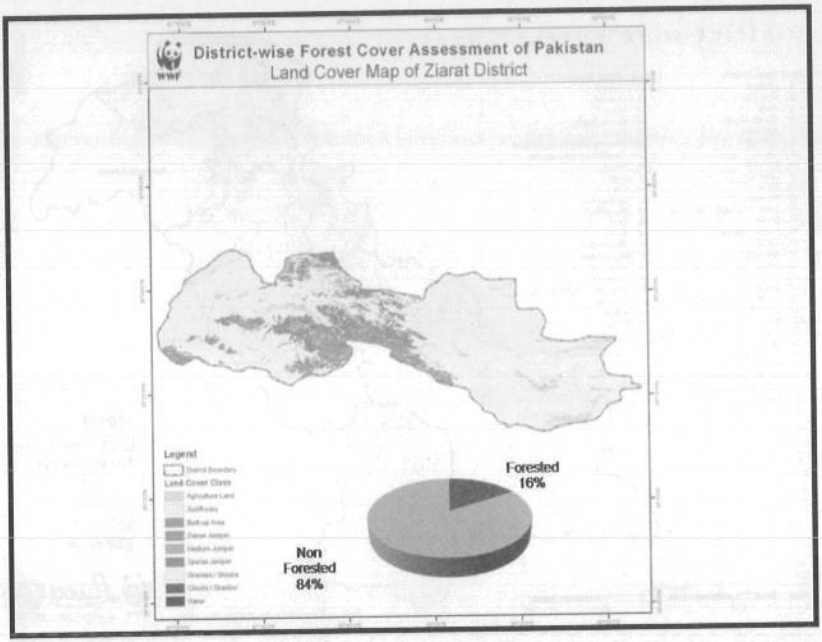
Data Source: Meteorology Department & WRRI, NARC/PARC, Islamabad, Pakistan
Developed by: WRRI, NARC/PARC, Islamabad, Pakistan
Modified by GCISC

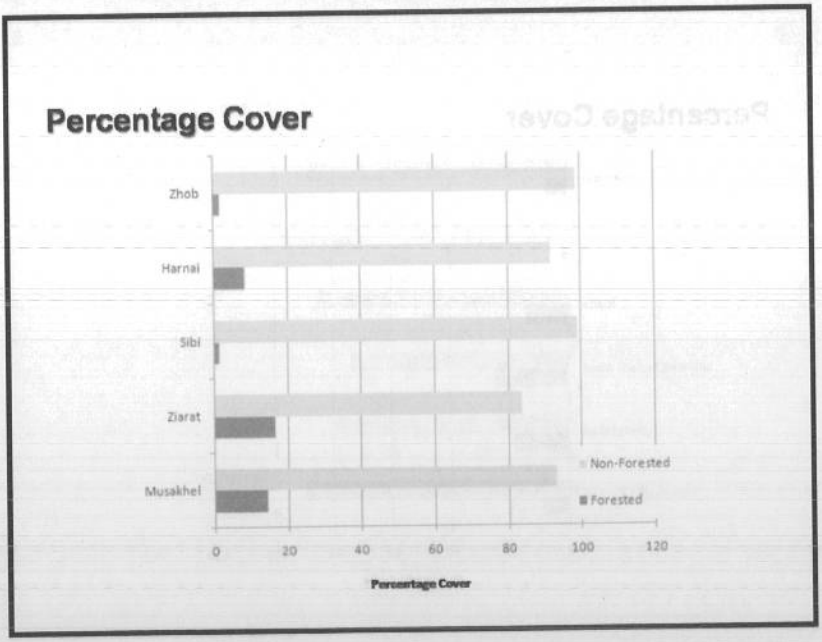
5

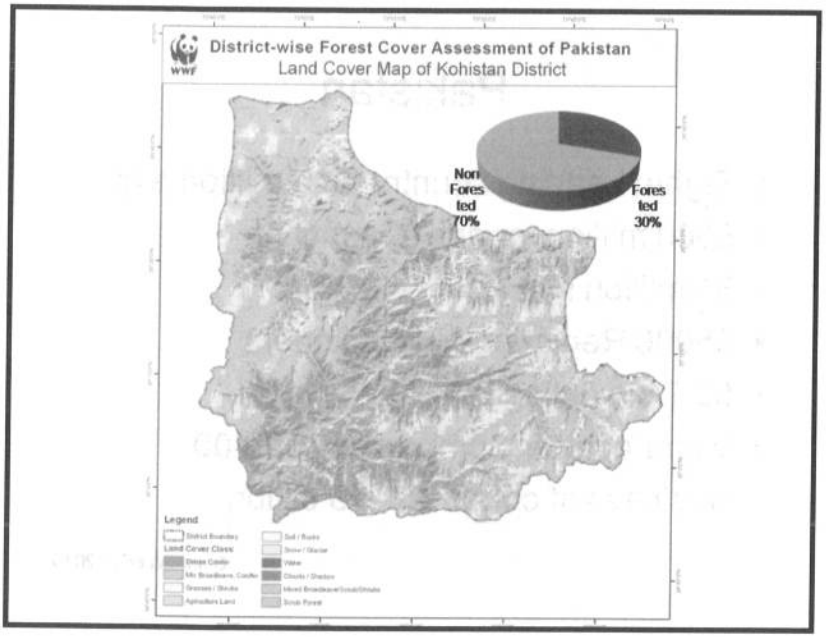


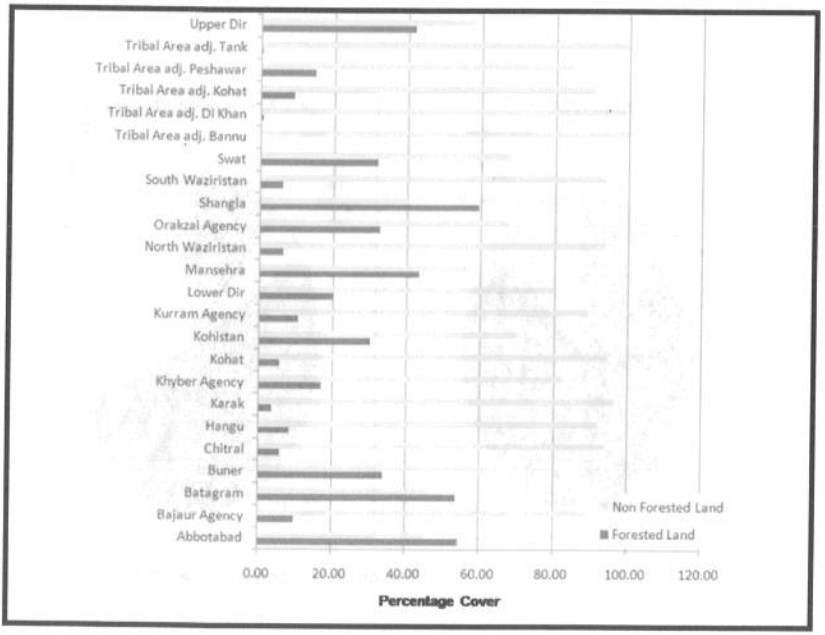

District wise Forest Cover
Rank District Name
1 Shangla
2 Upper Dir
3 Swat
4 Muzaffarabad
5 Batagram
6 Kohistan
7 Ziarat
8 Baltistan
9 Lower Dir
10 Buner
11 Mansehra
12 Tribal Area Adj D i Khan Distt
13 Dasnr
14 Kurram Agency
15 Ghizar
16 Islamabad
17 Bibi
18 Hangu
19 Abbottabad
20 South Waziristan Agency
21 Bajaur Agency
22 Karak
23 Thatta
24 Gilgit
25 Orakzai Agency
26 Mustakhel
27 Tribal Area Adj Bannu Distt
28 Naushahro Feroze
29 Chitral
30 North Waziristan Agency
Rank District Name
31 Jhelum
32 Mianwali
33 Gujrat
34 Khyber Agency
35 Quetta
36 Tribal Area Adj Peshawar Distt
37 Tribal Area Adj Kohat Distt
38 Pishin
39 Bagh
40 Kotli
41 Hyderabad
42 Nawabshah
43 Zhob
44 Sukkur
45 Muzaffargarh
46 Rawalpindi
47 Kohat
48 Shikarpur
49 Tribal Area Adj Tank Distt
50 Ghanche
51 Sherani
52 Harnai
Disputed Area
Legend
Provincial boundary
Forest cover (%)
0 - 5
5 - 25
25 - 50
50 - 100
Kilometers
0 95 190 380 570 760
Source: Forestry sector master plan 1992
WWF
Leica Geosystems


Percentage Cover
Shikarpur
Sukkur
Thatta
Shaheed Benazir Abad
Hyderabad
Naushahro Feroze
Non Forested
Forested
0 20 40 60 80 100 120
Percentage Cover


District-wise Forest Cover Assessment of Pakistan
Land Cover Map of Ziarat District
WWF
Legend
Forested
16%
Non
Forested
84%


Percentage Cover
Zhob
Harnai
Sibi
Ziarat
Musakhel
Non-Forested
Forested
0
20
40
60
80
100
120
Percentage Cover

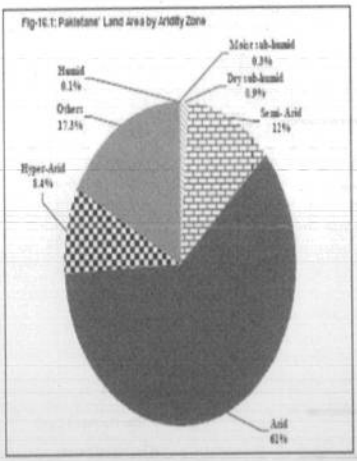

District-wise Forest Cover Assessment of Pakistan
Land Cover Map of Kohistan District
WWF
Non Forested 70%
Forested 30%
Legend

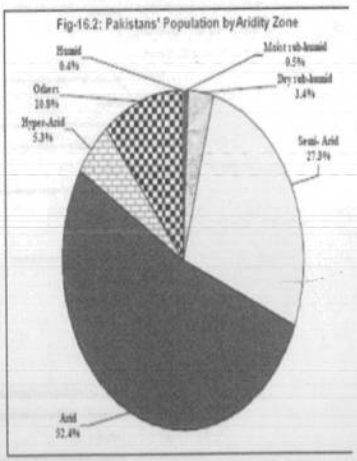

Upper Dir
Tribal Area adj. Tank
Tribal Area adj. Peshawar
Tribal Area adj. Kohat
Tribal Area adj. DI Khan
Tribal Area adj. Bannu
Swat
South Waziristan
Shangla
Orakzai Agency
North Waziristan
Mansehra
Lower Dir
Kurram Agency
Kohistan
Kohat
Khyber Agency
Karak
Hangu
Chitral
Buner
Batagram
Bajaur Agency
Abbotabad
Non Forested Land
Forested Land
0.00
20.00
40.00
60.00
80.00
100.00
120.00
Percentage Cover

Pakistan

- Eighth Leading country ($) 6 million exp
- 8500 million tonnes (Quantity)
- 31 million imp ($)
- 65000 Registered Practitioners
- 50 Tibia colleges
- Manufacturer Companies 300-400
- Business of comp. Rs. 10 billion

Shinwari et al. 2010





Source: Eco. Survey of Pak (2006-2007)

Table 3.9. Calculated desertification risk in Asia and the Pacific

Country	Desertification risk (%)
Australia	77
Bhutan	9
China	57
India	72
Indonesia	1
Japan	4
Korea, DPR	31
Lao PDR	1
Mongolia	100
Myanmar	1
Nepal	42
Pakistan	100
Sri Lanka	6
Viet Nam	2

Source: FAO (2003).

Endemic to Higher Altitudes

Baltoro Galciers

Baeapani, Deasai

Final Frontier of Flowering Plants

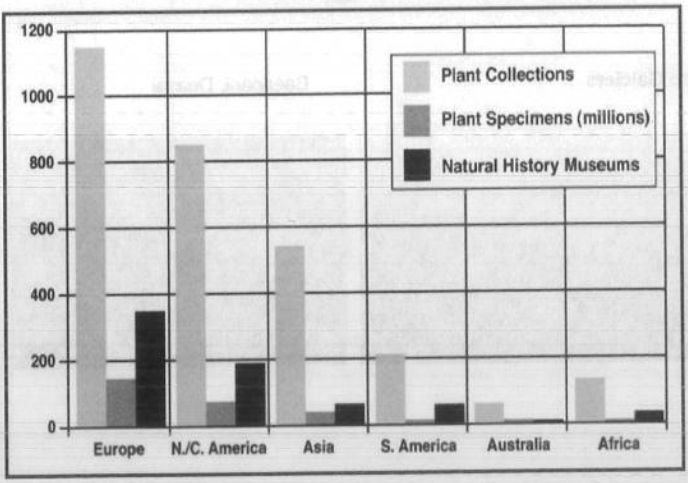
47% to 66% of the planet's estimated 70,000 undiscovered species are waiting to be unveiled in herbaria.

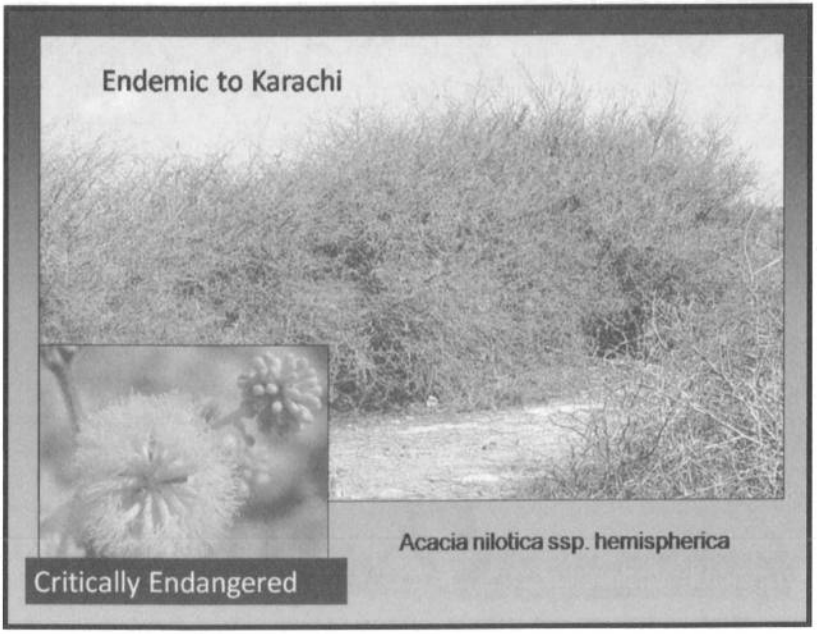
Proc. Natl. Acad. Sci. USA
doi:10.1073/pnas.1011841108
(2010)

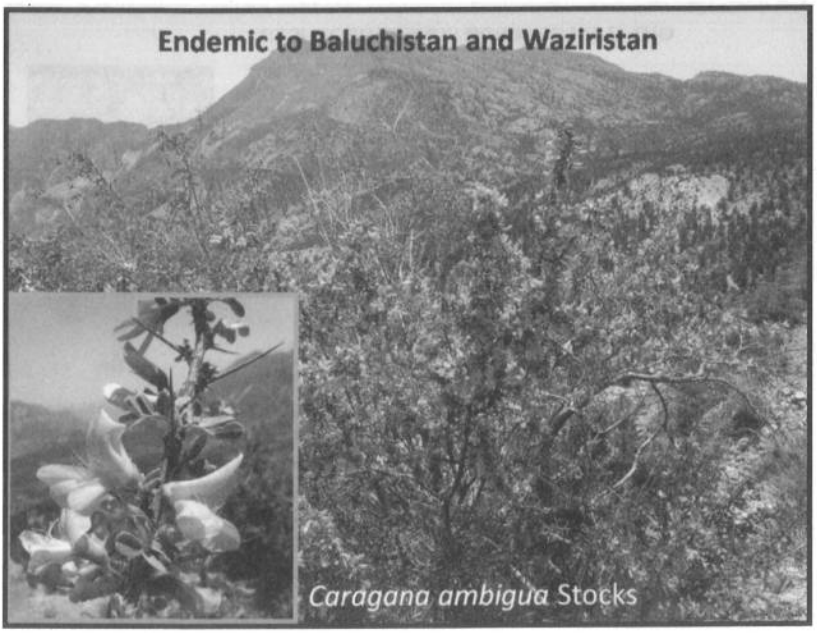
In Pakistan, especially in higher altitude, keeping in mind difficult terrain, the unknown %age is much higher

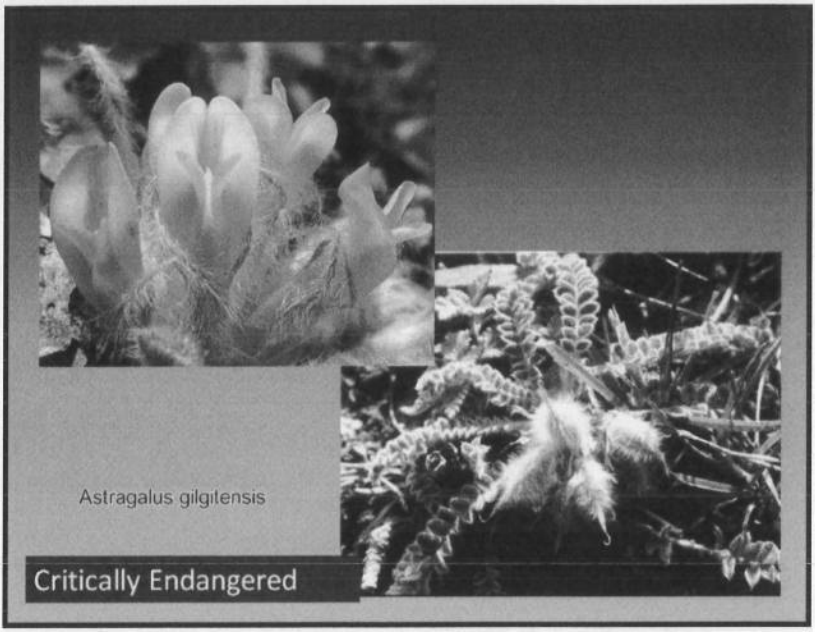
Lalia Peak & Trango Tower

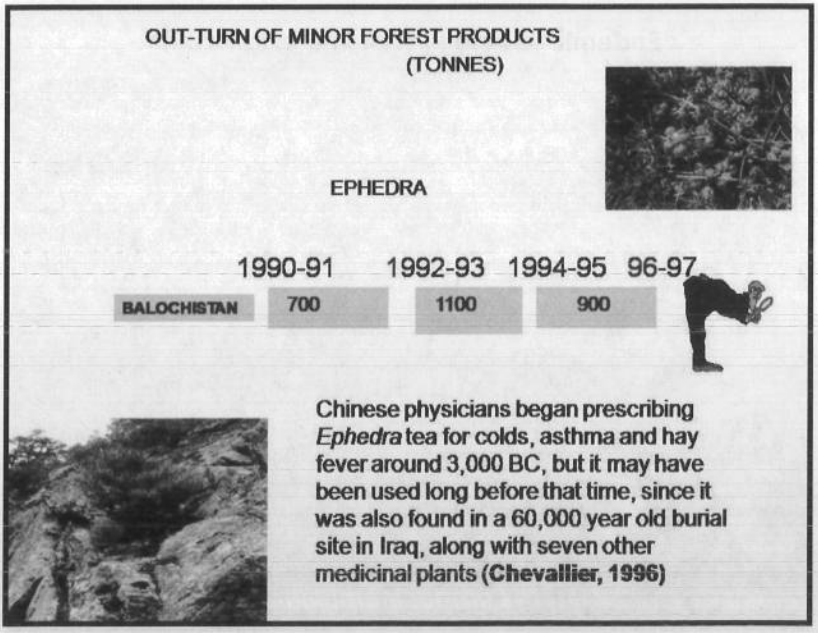
Poor representation of systematics infrastructure in Developing countries




Endemic to Karachi
Acacia nilotica ssp. hemispherica
Critically Endangered


Endemic to Baluchistan and Waziristan
Caragana ambigua Stocks


Astragalus gilgitensis
Critically Endangered


OUT-TURN OF MINOR FOREST PRODUCTS
(TONNES)
EPHEDRA
1990-91
1992-93
1994-95
96-97
BALOCHISTAN
700
1100
900
Chinese physicians began prescribing *Ephedra* tea for colds, asthma and hay fever around 3,000 BC, but it may have been used long before that time, since it was also found in a 60,000 year old burial site in Iraq, along with seven other medicinal plants (**Chevallier, 1996**)

Rate of loss

- The UNEP global biodiversity assessment:
  - Current estimated extinction rate of well-documented groups (vertebrates and vascular plants) are at least 50 to 100 times larger than the expected natural background
  - It could increase to 1000 times soon
  - Actual number of species unknown is 8 – 50 M
  - About 2 M is documented
  - In today's world, most extinctions will occur before the species even have been named and described, much less known ecologically

According to IUCN Red List (2010), species

- Threatened to extinction
  - 21% mammals
  - 12% birds
  - 28% reptiles
  - 30% amphibians
  - 26% fishes
  - 31% other invertebrates
  - 79% mosses
  - 61% ferns
  - 40% gymnosperms
  - 70% flowering plants
  - 16% algae
- Threatened
  - lichens and mushrooms species 100%

Several epidemics have been spread at higher virulence rates by losses of biodiversity and climate changes.

One-fifth of invertebrate species at risk of extinction Zoological Society of London (ZSL).

Nudibranch sea slugs face extinction

From the checkerspot butterfly to the giant squid, spineless creatures are thought to represent around 99% of biodiversity on Earth. Fewer than 1% of invertebrates had been assessed by IUCN.

ZSL report estimates that 34% of freshwater invertebrates could be under threat, including more than half of the world's freshwater snails and slugs. In the southeastern United States, which is a freshwater diversity hotspot, almost 40% of molluscs and crayfish could be wiped out owing to the effects of dams and pollution. In the oceans, almost one-third of reef-building corals are endangered largely because of climate change, which causes coral bleaching and ocean acidification.

•Brendan Borrell, Nature 03 September 2012

Poor habitat structure
Reduce food supply
Hunting

Loss in a single species can impact
genetic, microbial communities, vector species, host species, community, and habitat structures

Population endangered

Bird by bird: Thar's bedeviled peacocks dancing to their deaths

-Population about 60000
Diseases unknown
No vaccine
May be lack of food but ----??

www. Tribune.com (July 20, 2012

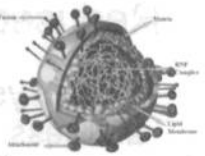
Newcastle disease: 2003 and 2011

In 2003, peacocks died from the same disease but at that time authorities took an early action. In February 2011, a milder version of NDV that caused the birds of Thar region to have swollen eyes and loss of appetite, this year the symptoms are much different that is the birds keep whirling.

Is it harmful to human beings?

Other than causing seasonal flu-like symptoms or mild eye infection, the Newcastle disease is harmless to human beings.

Weather: Mix of floods 2011 and drought 2012



Symptoms of NDV

Following are the symptoms of Newcastle disease virus in birds that affects the metabolism and neurological systems of the bird such symptoms disfigures the beauty of Peacock;

Loss of appetite.
Coughing.
Sneezing.
Diarrhoea.
Loss of feathers.
Drooping neck.
Depression.
Nausea.
Whirling and spinning.

Biodiversity loss

Biodiversity loss on larger or smaller scales and even extinction of species is caused by three major factors, Emerging Infectious Diseases (EIDs), global warming, and invasiveness of species

Reduced Biodiversity unable to----

- If ecosystems with reduced biodiversity are less able to provide the ecosystem services—such as carbon sequestration, nutrient cycling and resistance to drought—on which humans rely.
- Ecosystem functions decline as biodiversity is lost. Reduced disease transmission is an important ecosystem service provided by high biodiversity.

-(Naeem et al. 2009, Oxford University Press).

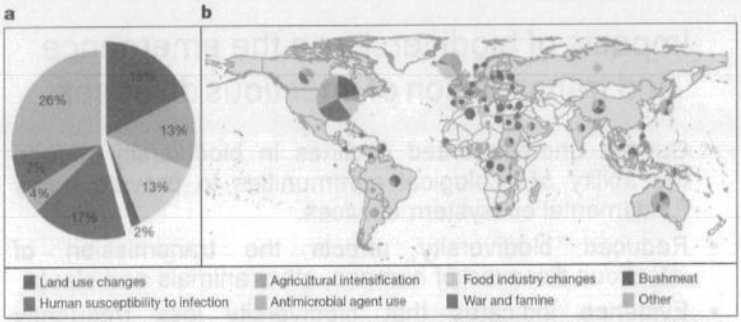
Impacts of biodiversity on the emergence and transmission of infectious diseases

- Current unprecedented declines in biodiversity reduce the ability of ecological communities to provide many fundamental ecosystem services.
- Reduced biodiversity affects the transmission of infectious diseases of humans, other animals and plants.
- Evidence indicates that biodiversity loss frequently increases disease transmission.
- Areas of naturally high biodiversity may serve as a source pool for new pathogens.
- Current evidence indicates that preserving intact ecosystems and their endemic biodiversity should generally reduce the prevalence of infectious diseases.

Keesing et al., Nature vol. 468: Dec., 2010

Emerging Disease Events-----

- Between 1940 and 2004, over 300 emerging disease events were identified in humans around the world.
- Concomitantly, other emerging infectious diseases also appeared in wildlife, domesticated animals, and crop and wild plants.
- Emerging infectious diseases include those in which the pathogen has evolved into a new strain within the same host species, for example, through the evolution of drug resistance (methicillin-resistant Staphylococcus aureus or MRSA) or switched to new host species (for example, human immunodeficiency virus or HIV, severe acute respiratory syndrome or SARS).
- In some cases, the switch to new host species is accompanied by a change in geographic range (for example, West Nile virus in the Americas).



Drivers and locations of emergence events for zoonotic infectious diseases in humans from 1940–2005. a,Worldwide %age of emergence events caused by each driver; b, Countries in which the emergence events took place, and the drivers of emergence. The size of the circle represents the number of emergence events: for scale, the number of events in the United States was 59. Globally, almost half of these diseases resulted from changes in land use, changes in agricultural and other food production practices, or through wildlife hunting, which suggests that contact rates between humans and other animals are an important underlying cause of zoonotic disease emergence. 'Other' includes international travel and commerce, changes in human demographics and behaviour, changes in the medical industry, climate and weather, breakdown of public health measures, and unspecified causes.

Plant biotechnology in support of the Millennium Goals

Aim of Millennium Dev. Goals (2000), set by 189 states "to reduce extreme poverty in the world".

1. Eradicate extreme poverty and hunger
2. Achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria and other diseases
7. Ensure environmental stability
8. Develop a global partnership for development.

Using Biotechnology, Tailor-made solutions to particular problems appear more and more feasible while biosafety issues and economic considerations are part of the constraints that need to be observed and respected before large-scale application of the products of biotechnology can be envisaged.

•"...high per capita growth driven by agricultural productivity..." is singled out as one of the key factors to promote progress towards the reduction of poverty in the world.

•Agricultural productivity depends on: –
-advances in education, infrastructures,
-The socio-economic environment,
-technical engineering,
-Agricultural input & agronomic practices
-reduction of pre- & post-harvest losses.

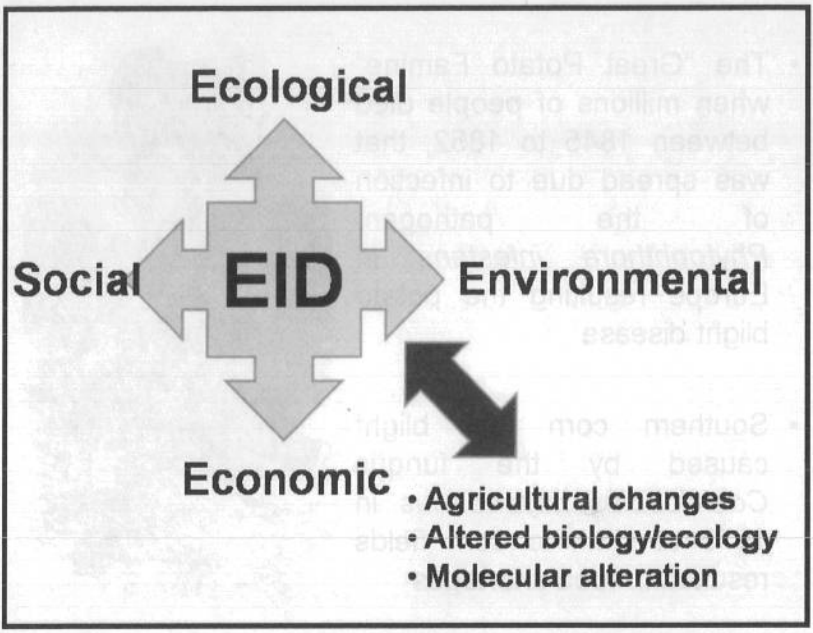
Historically, two components have almost equally contributed to progress in agricultural productivity: (1) technical advances (engineering, chemical, etc.) and (2) advances in the understanding of the biological background and its application (genetics, plant physiology, biotic & abiotic stress, defence against predators, etc.).

- The "Great Potato Famine" when millions of people died between 1845 to 1852, that was spread due to infection of the pathogen, *Phytophthora infestans* in Europe resulting the potato blight disease

- Southern corn leaf blight caused by the fungus *Cochliobolus miyabeanus* in 1973 at USA to corn fields resulted in food shortages

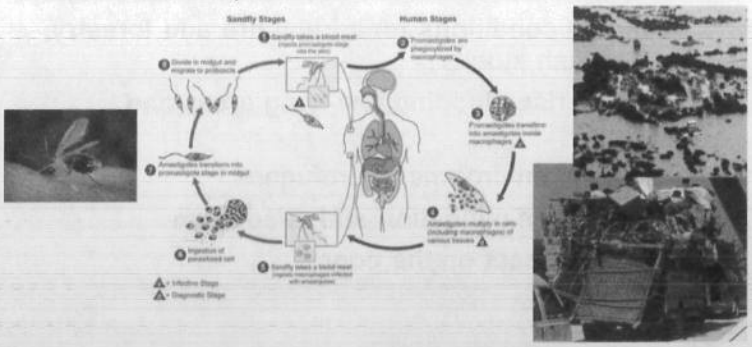
Human Impacts of Climate Change

- **An increase in extreme weather events: floods, droughts, cyclones**
- **Less winter snowfall, melting glaciers, water shortages**
- **Changing conditions for agriculture and forestry, shifting fish stocks**
- **Sea level rise, flooding low-lying areas and islands**
- **Millions of environmental refugees**
- **High costs of mitigation and adaptation**
- **Greatest impact on the poor**



Millions of environmental refugees

- Leishmaniasis is caused by the bite of tiny sand flies i.e. *Phlebotominae*
- What produced after bite?
- Causes cutaneous, mucocutaneous and visceral leishmaniasis.



- Affected more than 15 million people in 88 countries and 397 million people are at risk of acquiring leishmaniasis
- WHO had requested Research Institutes to search for the cure of this disease
- Three major species of *Leishmania* in Pakistan
  - *Leishmania major* (Cutaneous Leishmaniasis)
  - *Leishmania tropica* (Cutaneous Leishmaniasis)
  - *Leishmania infantum* (Visceral Leishmaniasis)

(Bhutto *et al. Acta Tropica* (2009): 3; 295-8)

To summarize

Community stability, productivity and food-web interactions are indirectly correlated with biodiversity, any changes in these factors will cause losses in biodiversity at both the community and ecosystems levels

Table 3.9. Calculated desertification risk in Asia and the Pacific

Country	Desertification risk (%)
Australia	77
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China	57
India	72
Indonesia	1
Japan	4
Korea, DPR	31
Lao PDR	1
Mongolia	100
Myanmar	1
Nepal	42
Pakistan	100
Sri Lanka	6
Viet Nam	2

Source: FAO (2003).

The loss of species

- The loss of species in ecosystems can certainly effect the ways in which those systems work together to cycle essential nutrients and water and process energy.
- Reduction of the number of individuals.
- Keystone species
- Extinction: marking the end of 3.5 billion years of evolutionary development.
  - Irreversible loss of unique genetic information
  - Loss of biodiversity
  - Loss of potential economic value in terms of services and products.

Integrated research

- Interaction of mountains and oasis and deserts
- Regional sustainable development
- Biodiversity
- Information systems of central arid area

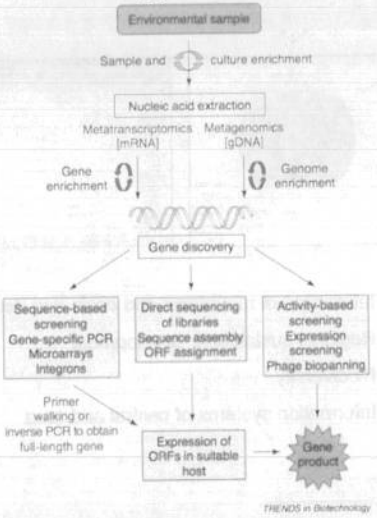
Metagenomics

Application of techniques to the study of communities of microbial organisms directly in their natural environments, by passing the need for isolation and lab cultivation of individual species.

Revolution in microbiology:

- Access to the uncultured (>99% bacteria)
- Access to whole microbe communities in a variety of natural environments

Metagenomics



Metagenomics Applications

Microbes ubiquitous and essential to life

- Fundamental research: microbe diversity and microbial ecology.
- Agriculture: Optimization of natural plant fertilization, rapid identification of pathogens responsible of emerging diseases
- Biomolecules:Search for new antibiotics, role of human gut microbes (microbiome) in nutrition and obesity
- Bioindustry: discovery of novel enzymatic activities (ex. enzymes specialised in lignocellulose degradation in termite guts)
- Environment: Biosensors, bioremediation of contaminated soils, industrial treatment of wastewater

Phylogenetic analysis of bacterial community and isolation of novel biomolecules from peat bog

Isolate
Genomic DNA

Cultured analysis	PCR for 16S rRNA gene Primer: 27f and 1492r	Construction of Metagenomic libraries
Isolation of novel bacterial species	16S rRNA gene Clone Libraries (TA Vector)	Functional screening of the libraries
Functional characterization for biomoleculess	Sequencing of the clones libraries	Identification of novel antibiotics and catalytic molecules
	Blast and phylogenetic analysis	

Phylogenetic analysis of bacterial community composition in Deosai peat land of Pakistan

- The primary objective of this study is to analyze bacterial community of the Deosai peat land and to compare the cultured bacterial taxa with the total bacterial community.
- Secondly to explore bacterial diversity of the peat land, with the bioprospecting for isolation novel bacterial species.
- Purified strains from the cultured analysis will be exploit for potential discovery of new biotechnology products, such as antimicrobial agents, and catalytic enzymes.

Isolation of novel Biomolecules from Metagenome of the Deosi Peat Land

- The untapped functional potential present in the uncultivable part of the micro biota of these soils will be accessed using met genomic cloning of peat bog DNA
- Libraries constructed on the basis of the total and the active cell fractions, as well as the isolates, will be screened for anti-microbial function
- Selected clones will be screen with respect to the nature of the antagonistic compounds and production loci, involving sequencing
- Potential producer strains will be optimized as to gene expression, growth and stability

Endophytic Microbes

Microbes that live within plants without causing them disease

- Live in a symbiotic realtionship with their host
- Provide phytohormones, acquisition of nutrients and inhibit phytopathogens and pests in return for food and shelter
- Both fungi and Bacteria

Endophytic Microbes

- Nearly 300,000 known flowering plant species on earth
- Each individual plant is hosting endophytes
- Only a few these plants have ever been completely studied relative to their endophytic biology
- Opportunity to find new, interesting and biotechnologically useful endophytic microbes among myriads of plants in different settings and ecosystems is great

Endophytic Microbes

- These microbes are threatened by extinction with the loss of plant diversity (partly due to climate change) and need to be discovered before they are extinct
- Increased incidence of abiotic and biotic stress due to climate change threatens the yield of major crops
- Endophytes have been shown to impart invasive and stress tolerant properties to their hosts
- Endophytes have immense potential in sustainable agriculture since they provide a cheaper, safer and effective alternate to current practices of crop yield enhancement

Applications of Endophytes

Industrial & Medical

- Antibiotics (Cryptocin, Ecomycins, Ambuic acid)
- Antiviral (Cytonic acids A and B)
- Anticancer (Paclitaxel)
- Immunosuppressant (Subglutinol A and B, Cyclosporine)
- Antioxidants (Pestacin, Isopestacin)
- Anti-diabetic agent (L-783,281)
- Biofuels

Bioremediation

- Phenols
- Chloro-phenols
- MTBE
- TCE
- 2,4-D
- TNT
- BTEX

Plant Health & Protection

- Antimicrobial compound production
- Induced Systemic Resistance (ISR)
- Bio-insectisides (Nodulisporic acids)

Plant Yield & Growth promotion

- Growth Hormones (IAA)
- Nitrogen fixation
- P solubilition
- Nutrient availability
- Phyto-stimulation

A Bloody Boon for Conservation

Leeches provide traces of DNA from other species.

Bloodsucking leeches are offering the best hope of finding one of the world's rarest animals. The saola (*Pseudoryx nghetinhensis*) was first described from skulls found in a Vietnamese forest reserve, but the elusive antelope has rarely been seen alive.

Gauging biodiversity much more efficient than conventional methods. Rather than setting out camera traps, the idea is to collect and sequence DNA left in the environment, in everything from soil to leeches' stomachs.

To collect environmental DNA that have emerged in recent years.

- The diet of a leopard by sequencing DNA in its faeces;
- Tracked earthworm communities in soil;
- Reconstructed ancient Siberian habitats from DNA preserved in permafrost.
- Researchers refer to environmental DNA studies as 'meta-bar-coding', because they rely on DNA bar codes: short DNA sequences that uniquely identify a species..

Scientists hope to find DNA from the rare saola in leeches from the antelope's expected range.

Bloodsuckers feast on the forest's rare delicacies.

http://www.nature.com/news/a-bloody-boon-for-conservation-1.10499?WT.ec_id=NEWS-20120424
Ewen Callaway 23 April 2012

Pathogens and dual use nature of DNA synthesis techniques

Fears grow over lab-bred flu
Scientists call for stricter biosafety measures for dangerous avian-influenza variants.

- It is a nightmare scenario: a human pandemic caused by the accidental release of a man-made form of the lethal avian influenza virus H5N1.
- Recently created mutant H5N1 variants that can be transmitted between ferrets merely breathing the same air, generally an indicator that the virus could also spread easily among humans.
- The work raises the spectre of a disease that spreads as fast as ordinary seasonal flu, but with a fatality rate akin to wild-type H5N1 — an order of magnitude greater than the mortality rate of roughly 2.5% seen during the catastrophic flu pandemic of 1918.

20 December 2011 Declan Butler, News Nature: vol 480: 7378
http://www.nature.com/news/fears-grow-over-lab-bred-flu-1.9692

Call for 60-day suspension of mutant flu research

The avian flu virus could cause a pandemic if it mutates into a form that is more easily transmitted between humans. scientists who created mutant strains of the H5N1 avian influenza virus, leading flu researchers have called for a 60-day voluntary pause on such work. The call comes in a statement jointly published today in *Nature* (R. A. M. Fouchier *et al. Nature* 481, 443; 2012) and *Science*.

Bioterrorism is just one potential risk of such research. More worrying to some researchers is that if a mutant virus were to accidentally escape from the lab, it could cause a H5N1 pandemic.

US National Science Advisory Board for Biosecurity (NSABB) — asked both journals to publish only the main conclusions of two flu studies, but not to reveal details "that could enable replication of the experiments by those who would seek to do harm" (see 'Call to censor flu studies draws fire'). The journals and the authors have agreed to this redaction, on the condition that a mechanism is established to disseminate the information to legitimate flu researchers on a need-to-know basis.

The Reconstruction of the 'Spanish Flu'

Efforts to reconstruct the 1918 flu virus (also known as 'Spanish flu') started in the mid 1990s, when Dr Jeffrey Taubenberger from the US Armed Forces Institute of Pathology in Washington DC succeeded in recovering and sequencing fragments of the viral RNA from preserved tissues of 1918 victims.

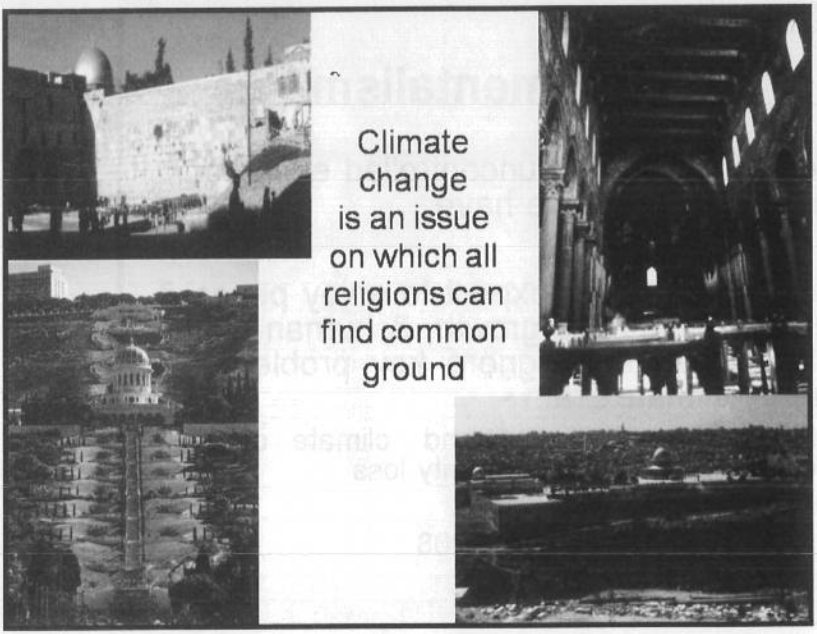
Environmentalism

- We are running an uncontrolled experiment on the only home we have.
- We can no longer expect to enjoy peace & security, economic growth, & human rights, if we continue to ignore key problems of energy-climate Era:
  - Energy supply & demand, climate change, energy-poverty & biodiversity loss

Friedman, 2008

Universities need to Change?

- Universities have no overall map or vision of how the research conducted will help humans to live within the global ecosystem.
- Different specialties collide: economies, natural science, social sciences
- Potential damage to the natural and social environment by research and its results is not systematically investigated.
- Students are not trained in interdisciplinary systems thinking.



Species Multiply as Earth Heats up

- Biodiversity increases with gentle warming.
- Rather than kicking off the expected cycles of extinction, periods of warming in Earth's history were accompanied by increased biodiversity. But this does not mean that the mass extinctions that are taking place today, with Earth warming at an unprecedented rate, will be reversed in future.

According to Mayhew, et al. 2012 (Proc. Natl Acad. Sci.) in 540 million years of Earth's history[1]. They found that when temperatures were high, so was biodiversity. When temperatures fell, biodiversity also declined.

Richard Lovett, Nature:03 September 2012

Warming produces both extinctions and originations, and in the past the originations of new species have outstripped the loss of old ones, says Mayhew. But this does not mean that today's climate change will be beneficial.

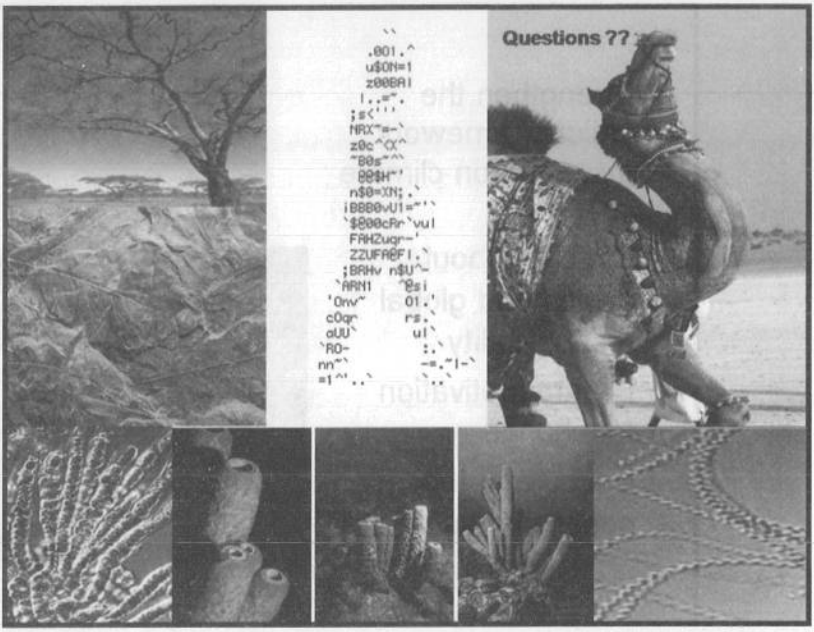
- Strengthen the ethical framework for action on climate change
- Educate about values and global responsibility
- Create motivation for change
- Encourage the necessary sacrifices

Karambar Lake (Chitral)

Values for a sustainable society

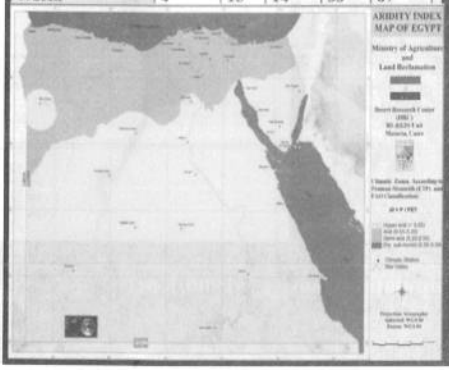
- Justice
- Solidarity
- Altruism
- Respect
- Trust
- Moderation
- Service

Kachura Lake



Thank You

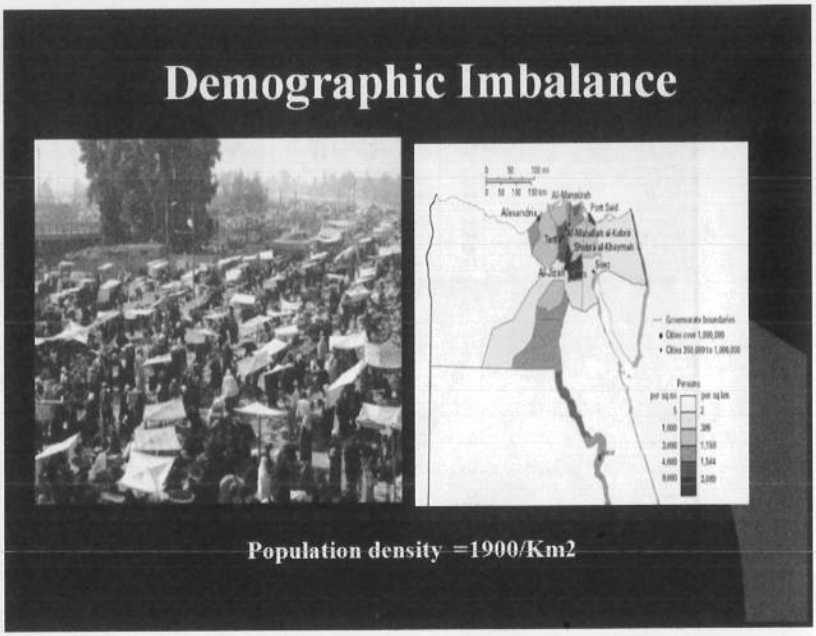
	Dry land				
	Hyper arid	Arid	Semi Arid	Total	Humid
Egypt	86	14	-	100	-
Libya	75	23	2	100	-
Algeria	50	38	9	97	3
Sudan	24	34	34	92	8
Palatine	19	42	15	76	24
Jordan	5	92	3	100	-
Morocco	-	27	52	80	20
Tunis	-	75	14	89	11
Lebanon	-	-	-	-	100
Syria	-	16	73	89	11
IRAQ	-	80	16	96	4
Kuwait	-	100	-	100	-
Yemen	-	44	42	86	14
Rest of Peninsula	21	69	10	100	-
Arab World	27	43	16	96	4
World	4	15	14	33	67

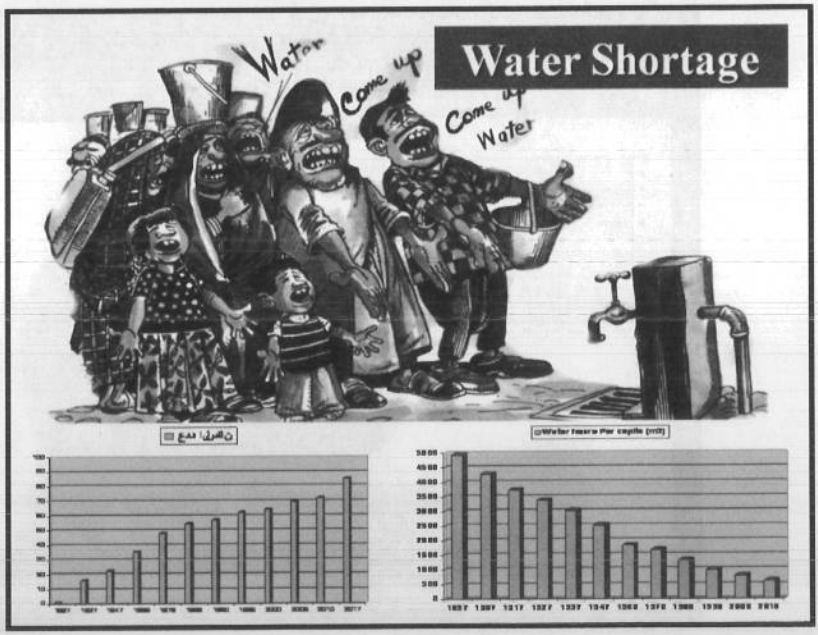


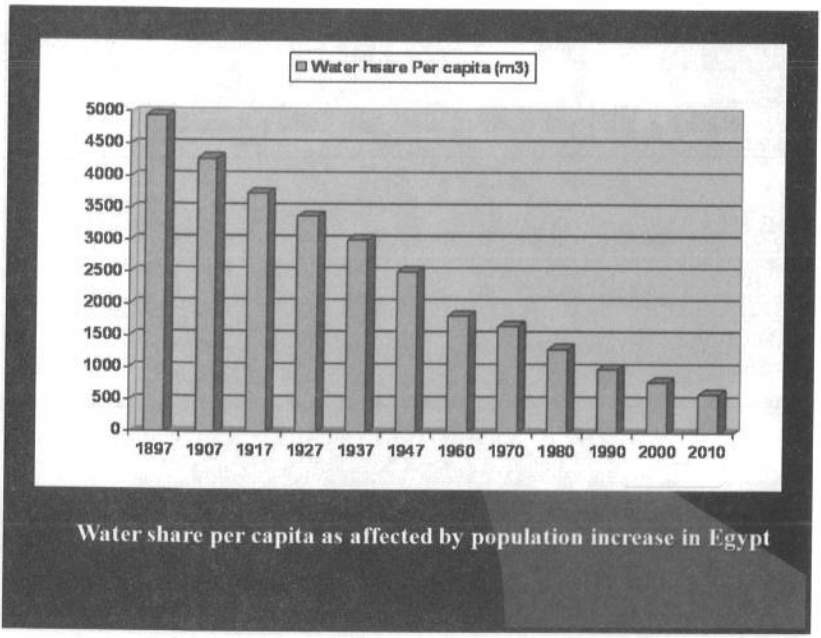
EGYPT IS HYPERARID

- Egypt occupies about one million square kilometers, 86% lies entirely in hyper arid and 14% in arid climatic conditions.

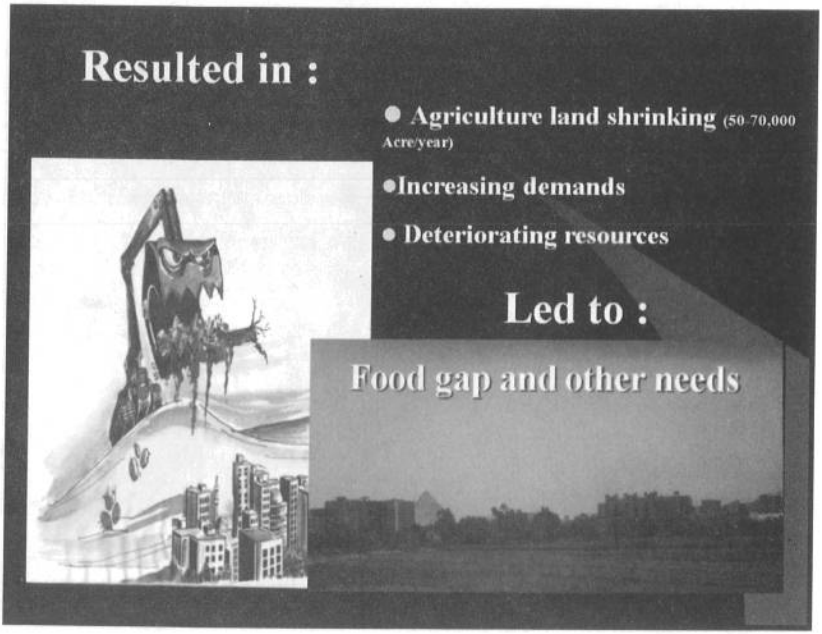
الانفجار السكانى

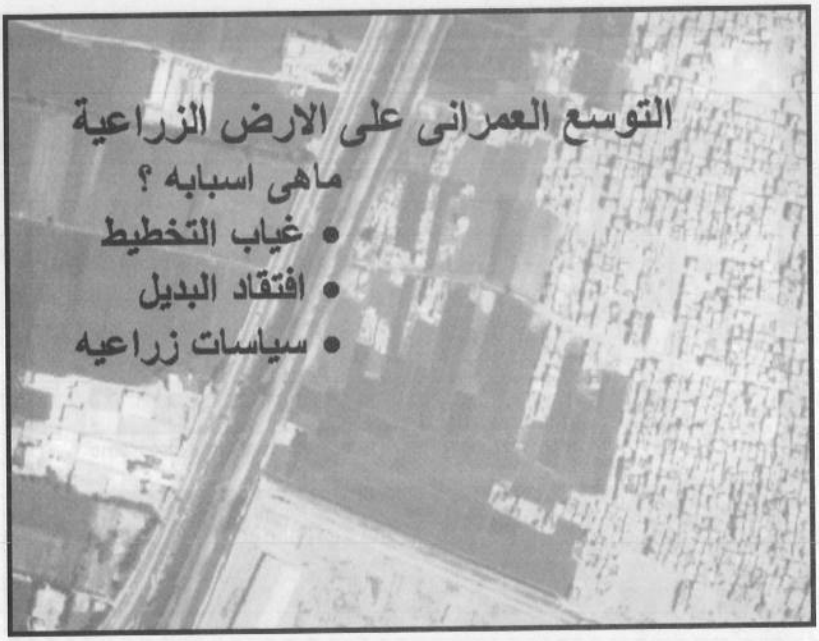

Demographic Imbalance
Population density =1900/Km2

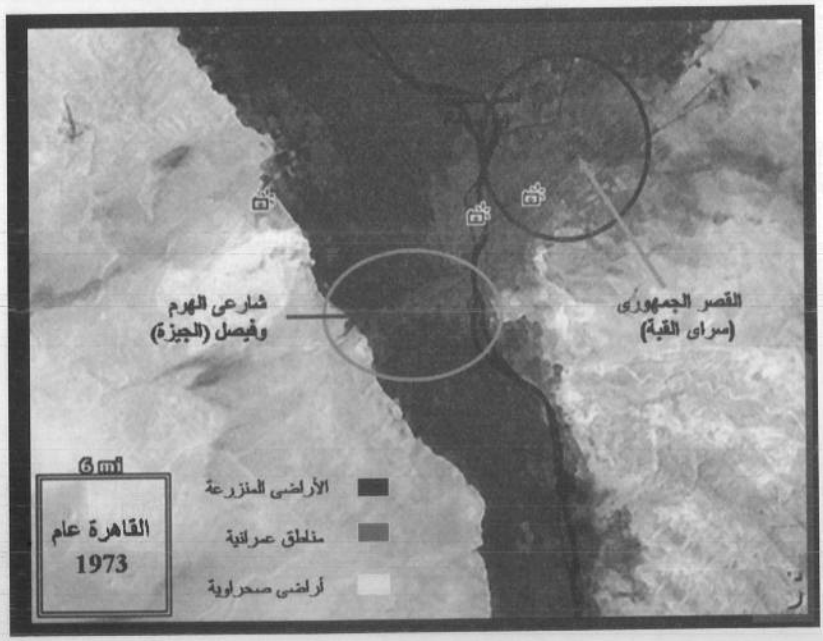

Water Shortage
Water
Come up
Come up
Water

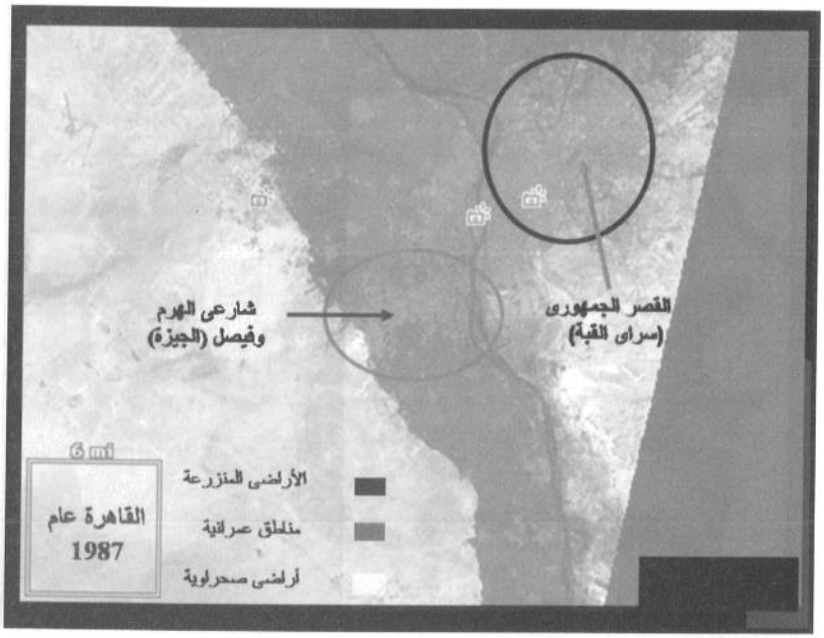


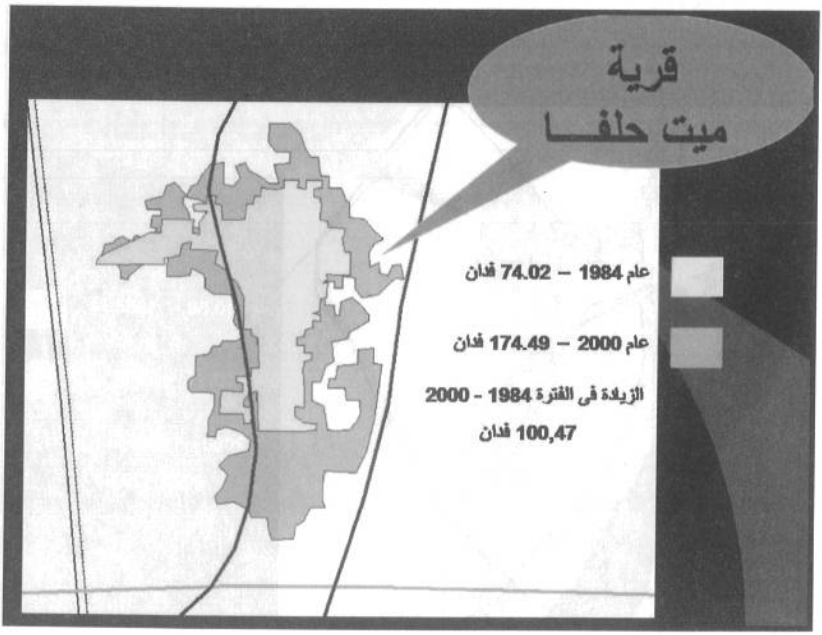
Water share per capita as affected by population increase in Egypt

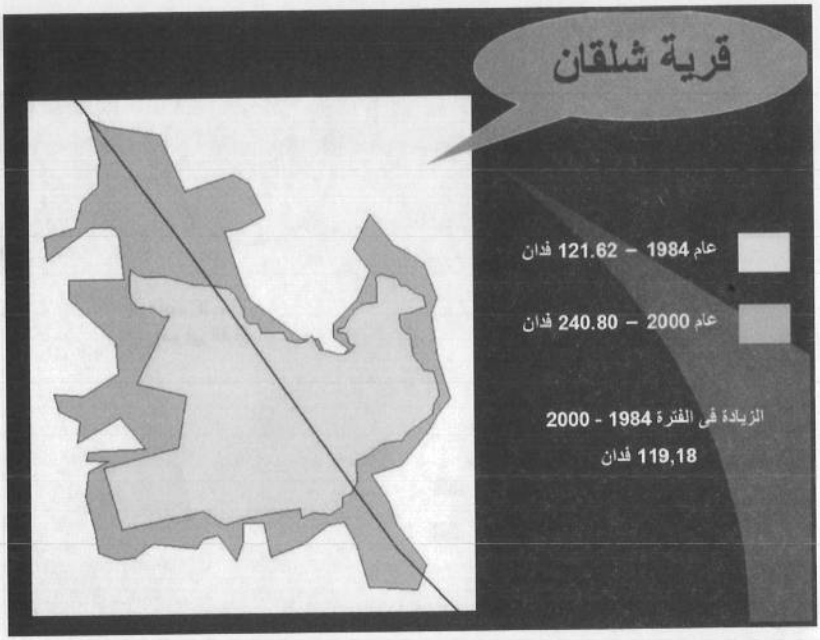



التوسع العمرانى على الارض الزراعية
ماهى اسبابه ؟
• غياب التخطيط
• افتقاد البديل
• سياسات زراعيه


شارعى الهرم
وفيصل (الجيزة)
القصر الجمهورى
(سراى القبة)
القاهرة عام
1973
الأراضى المنزرعة
مناطق عمرانية
أراضى صحراوية

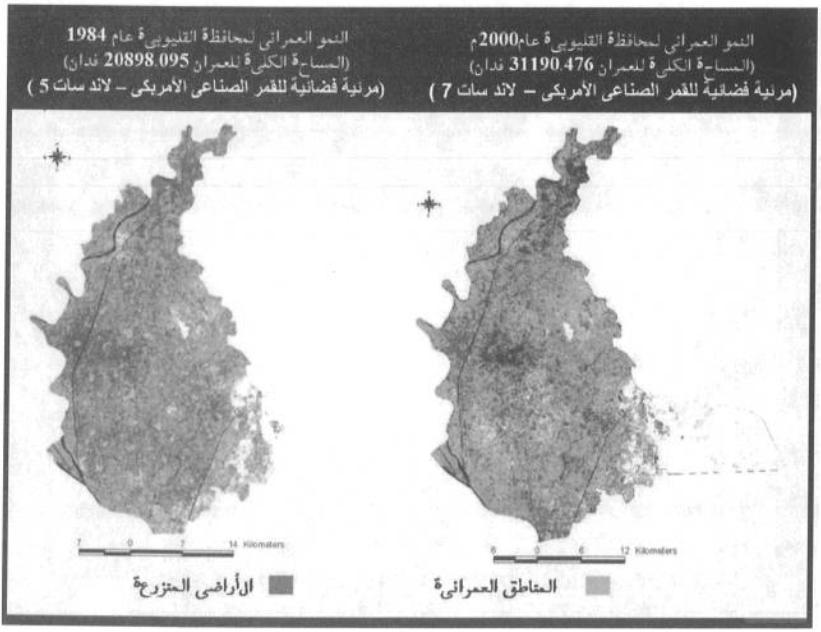

شارعى الهرم
وفيصل (الجيزة)
القصر الجمهورى
(سراى القبة)
6 mi
القاهرة عام
1987
الأراضى المنزرعة
مناطق عمرانية
أراضى صحراوية

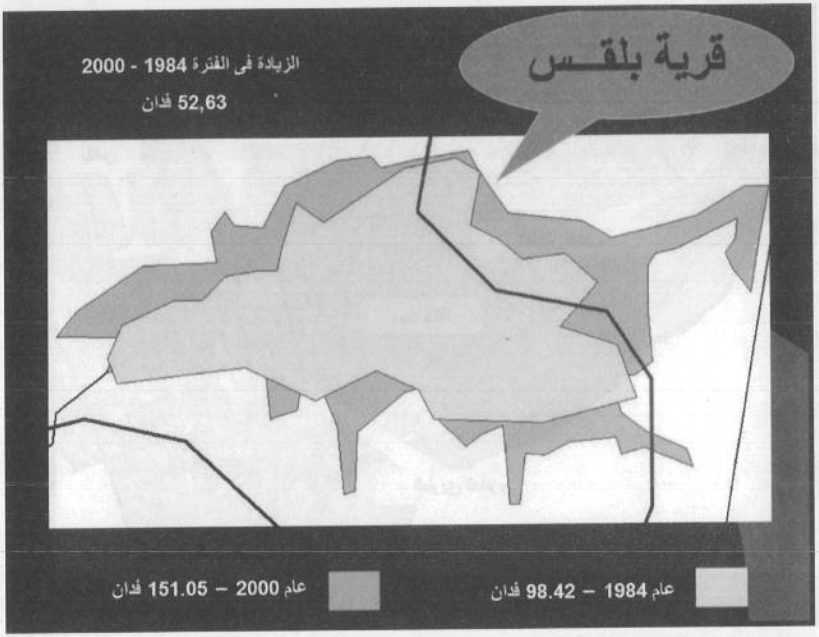

قرية
ميت حلفـــا
عام 1984 – 74.02 فدان
عام 2000 – 174.49 فدان
الزيادة فى الفترة 1984 - 2000
100,47 فدان


قرية شلقان
عام 1984 – 121.62 فدان
عام 2000 – 240.80 فدان
الزيادة فى الفترة 1984 - 2000
119,18 فدان


مدينة
القناطر الخيرية
عام 1984 – 310.86 فدان
عام 2000 – 440.31 فدان
الزيادة فى الفترة 1984 - 2000
129,63 فدان


شلقان
كوم أشفين
بلقس
القناطر الخيرية
ميت حلفا
الطريق الدائرى


النمو العمرانى لمحافظة القليوبية عام 2000م
(المساحة الكلية للعمران 31190.476 فدان)
(مرئية فضائية للقمر الصناعى الأمريكى – لاند سات 7)
النمو العمرانى لمحافظة القليوبية عام 1984
(المساحة الكلية للعمران 20898.095 فدان)
(مرئية فضائية للقمر الصناعى الأمريكى – لاند سات 5)
14 Kilometers
12 Kilometers
الأراضى المتزرعة
المناطق العمرانية


قرية بلقس
الزيادة فى الفترة 1984 - 2000
52,63 فدان
عام 2000 – 151.05 فدان
عام 1984 – 98.42 فدان

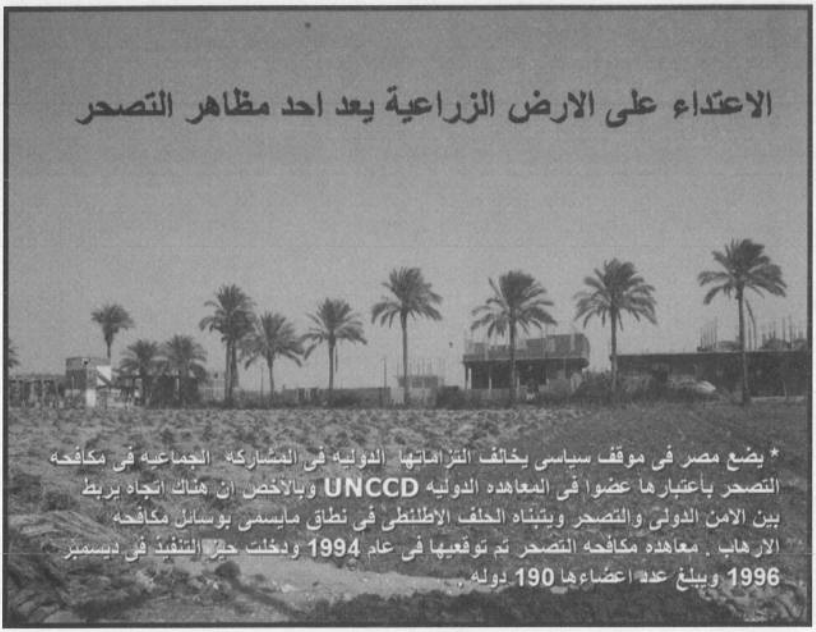

قرية كوم أشفين
الزيادة فى الفترة 1984 - 2000
54,86 فدان
عام 2000 – 129.5 فدان
عام 1984 – 74.64 فدان

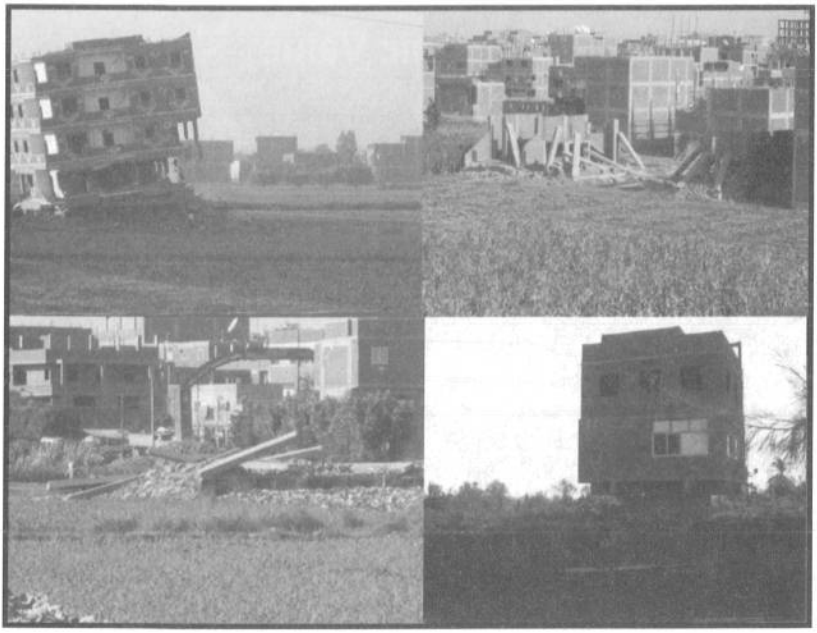
تتبع التوسع العمرانى فى بعض مدن و قرى جنوب محافظة القليوبية فى الفترة من 1984- 2000

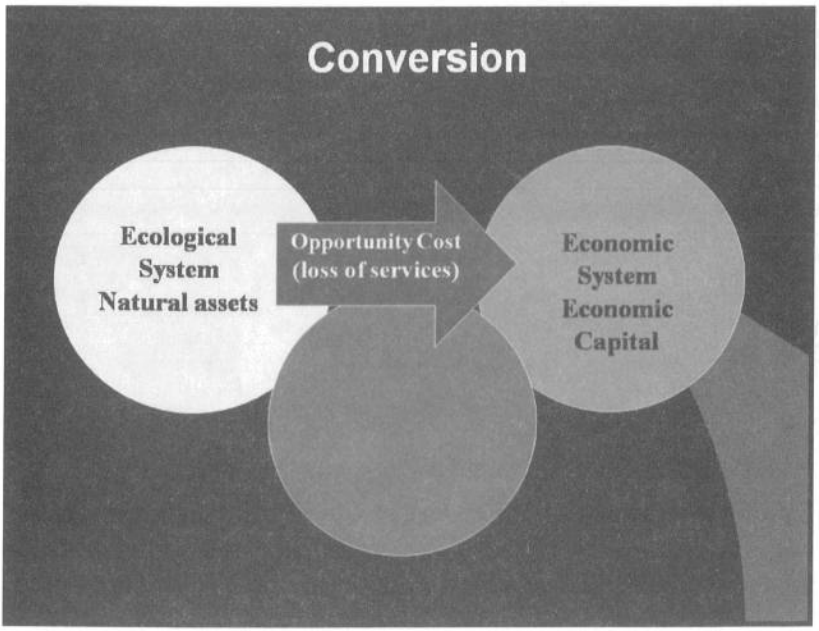
البيان المدينة القرية	مساحة العمران 1984 (فدان)	مساحة العمران 2000 (فدان)	الزيادة فى الفترة 2000 -1984 (فدان)	نسبة الزيادة العمرانية (%)
مدينة القناطر الخيرية	310.68	440.31	129.63	41.72
شلقان	121.62	240.80	119.18	97.99
ميت حلفا	74.02	174.49	100.47	135.73
كوم أشفين	74.64	129.50	54.86	73.449
بلقس	98.42	151.05	52.63	53.47

تتبع التوسع العمرانى فى بعض قرى محافظة قنا فى الفترة من 1986- 2002

البيان القرية	مساحة العمران 1986 (فدان)	مساحة العمران 2002 (فدان)	الزيادة فى الفترة 2002 -1986 (فدان)	نسبة الزيادة العمرانية (%)
الأشراف البحرية	19.482	63.936	44.454	228.17
الصالحية	39.482	81.337	41.858	106.01
دندرة	99.839	208.308	108.469	108.64
العسالية	41.969	86.373	44.404	105.80
الأشراف القبلية	42.312	78.201	35.889	84.82


الاعتداء على الارض الزراعية يعد احد مظاهر التصحر
* يضع مصر فى موقف سياسى يخالف التزاماتها الدوليه فى المشاركه الجماعيه فى مكافحه التصحر بأعتبارها عضوا فى المعاهده الدوليه UNCCD وبالاخص ان هناك اتجاه يربط بين الامن الدولى والتصحر ويتبناه الحلف الاطلنطى فى نطاق مايسمى بوسائل مكافحه الارهاب . معاهده مكافحه التصحر تم توقعيها فى عام 1994 ودخلت حيز التنفيذ فى ديسمبر 1996 ويبلغ عدد اعضاءها 190 دوله .




Conversion
Ecological System Natural assets
Opportunity Cost (loss of services)
Economic System Economic Capital

Economic Value :

Positive

?

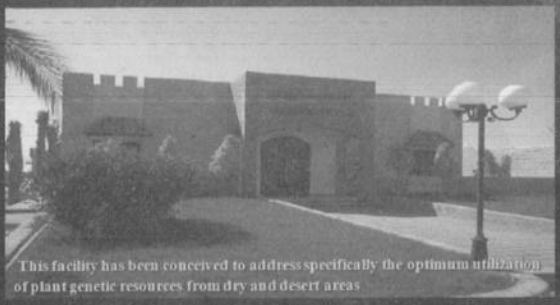
Negative

Reduce market distortions that adversely affect biological diversity.
Align incentives to promote biodiversity conservation and sustainable use
Internalize costs and benefits within the ecosystem potentiality and feasibility

Conversion often degrades service provision

To achieve the sustainable management of ecosystem services, PES schemes must be designed and implemented carefully, intelligently, and adaptively.
All payment types are instruments that by themselves aren't a solution

Egyptian Deserts Gene Bank



This facility has been conceived to address specifically the optimum utilization of plant genetic resources from dry and desert areas

Completely funded by
Ministry of Agriculture & Land Reclamation / DRC

Conservation

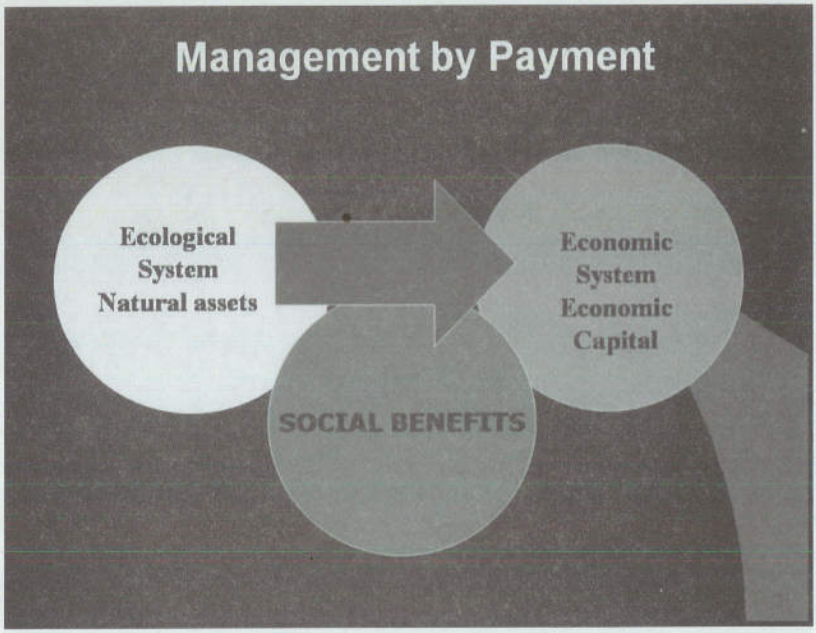
Short & medium term : (+4C & 40% RH).

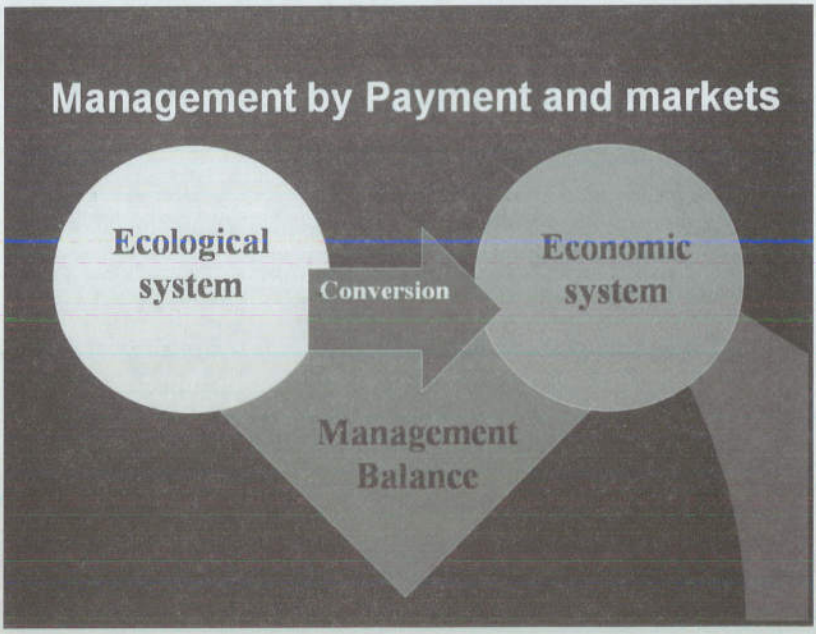
Long term storage : (-20 C)

A seed drying unit operating at +22C & 10% RH and a laboratory for seed processing and packing are included

Management by Pricing

Basically, gives us a way to calculate what nature already provides for free into the business plan. All industries on the planet are linked in some way to the natural environment whether the connection is obvious, as is the case for resource industries such as logging or mining, or more indirectly, for many businesses who simply rely on a healthy environment to maintain healthy employees, healthy customers and a functional working and distribution infrastructure.


Management by Payment
Ecological System Natural assets
Economic System Economic Capital
SOCIAL BENEFITS


Management by Payment and markets
Ecological system
Conversion
Economic system
Management Balance

Management driven by culture ORF

is unwritten law adopted by Bedouin, which covers several issues, Among the items of this law, there are rule regulating the collection and cutting of herbs and wood. It is forbidden to cut the green parts of the tree, and who does so, he is subject to a penalty of 50 LE.

Conservation Driven by Tradition Hema system

; is an Arabic word denoting reserve. This system helped to conserve the rang plants from extinction through centuries of misuse and communal grazing. No doubt , this system preserved the valuable genetic resources which are unfortunately being overexploited these days.

Management driven by Ethics
HELF

One of the most interesting regulation that the Bedouins in St. Katherine were practicing . It is a sort of communal regulations that was arranged by the Bedouin without any interference from the Governmental authorities for protection of the plants in certain places against grazing in certain period of the year to allow proper biomass production and fruit setting in that area.

Every year, the Sheikhs of the tribes agreed about certain area to be kept away from grazing in a period starting from the onset of rain fall in October till the end of the growing season.

The apricot fruit setting was the sign to cease the ***Helf*** for that season, then the zoned area was opened first for camels only for one month, thereafter, it was allowed for the other animals; sheep and goats. The selected area was changed every year. The **Helf** was arranged and guaranteed by the Sheikhs, who are the wise leaders of the tribes. There were serious penalties for anyone who did not follow the rules.

Social Equity

The majority of ecosystem services **are produced in rural and natural areas** where local communities depend closely on ecosystem goods and services and are the environmental stewards.

Therefore , we have to make sure that:

The communities and small scale producers are able to actively participate and benefit from ecosystem service markets.

Organizations and overseas development aid groups that care about the **equity dimension** in :
developing instruments to provide support, such as aggregation services to communities, shaping regulation to engage local small-scale providers, and clarifying tenure and user rights associated with these new opportunities.

Management by Pricing

Basically, gives us a way to calculate what nature already provides for free into the business plan. All industries on the planet are linked in some way to the natural environment whether the connection is obvious, as is the case for resource industries such as logging or mining, or more indirectly, for many businesses who simply rely on a healthy environment to maintain healthy employees, healthy customers and a functional working and distribution infrastructure.

Management driven by culture ORF

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Conservation Driven by Tradition
Hema system

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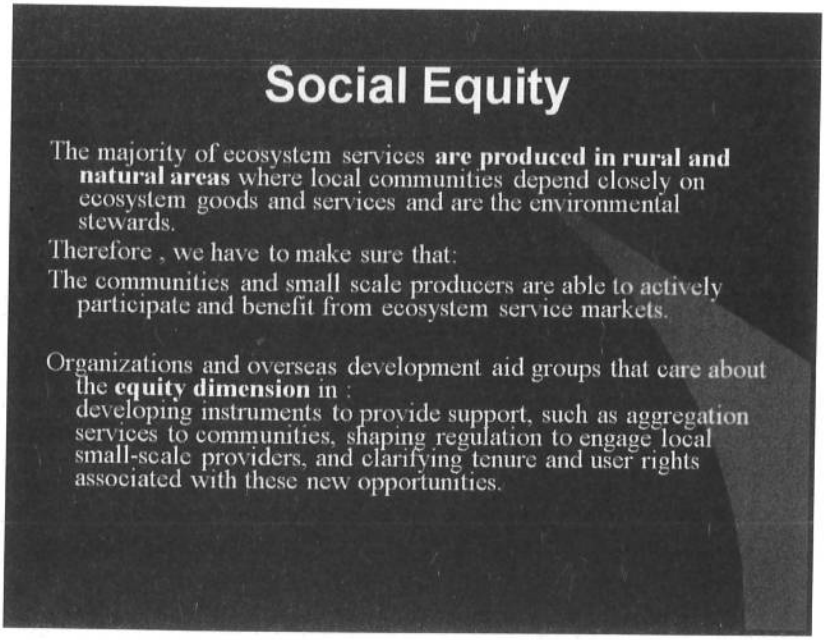
Management driven by Ethics
HELF

One of the most interesting regulation that the Bedouins in St. Katherine were practicing . It is a sort of communal regulations that was arranged by the Bedouin without any interference from the Governmental authorities for protection of the plants in certain places against grazing in certain period of the year to allow proper biomass production and fruit setting in that area.

Every year, the Sheikhs of the tribes agreed about certain area to be kept away from grazing in a period starting from the onset of rain fall in October till the end of the growing season.

The apricot fruit setting was the sign to cease the ***Helf*** for that season, then the zoned area was opened first for camels only for one month, thereafter, it was allowed for the other animals: sheep and goats. The selected area was changed every year. The **Helf** was arranged and guaranteed by the Sheikhs, who are the wise leaders of the tribes. There were serious penalties for anyone who did not follow the rules.


Social Equity
The majority of ecosystem services are produced in rural and natural areas where local communities depend closely on ecosystem goods and services and are the environmental stewards.
Therefore , we have to make sure that:
The communities and small scale producers are able to actively participate and benefit from ecosystem service markets.
Organizations and overseas development aid groups that care about the equity dimension in :
developing instruments to provide support, such as aggregation services to communities, shaping regulation to engage local small-scale providers, and clarifying tenure and user rights associated with these new opportunities.


Thank You

Environmental Vulnerability, Ecosystem Services and Climate Change Uncertainties in Morocco: A Case Study in the Tensift Basin

Dr. Saloua Rochdane
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Knowledge of the interactions among ecosystem services is necessary for making sound decisions about how society manages the services provided by nature. The goal of this paper is twofold: we first investigate the environmental vulnerability index (EVI) and then explore two specific policy-relevant interactions among ecosystem services: synergisms and tradeoffs.

Based on the EVI study developed by the South Pacific Applied Geosciences Commission (SOPAC), the vulnerability index was determined for anthropogenic, meteorological, biological, and geological events. The 50 indicators selected for use in the EVI are based on the best scientific understanding currently available and have been developed in consultation with, country experts, other agencies and interest groups. The EVI scale is a relative scale of vulnerability ranging from 1 – least vulnerable to 7 least resilient. It was found that the indicators with the highest scores (6 or7) were mostly anthropogenic in origin. In the opposite, climate change sub-indicator received a score of 3 or less: there is no evidence of impact of climate change at present time.

In the following step we use the results of these case EVI studies to develop different approaches for understanding the nature of trade-offs. We consider the interactions among ecosystem services in three major sections. First, we explore

the links between ecosystem service trade-offs, synergisms, and the Millennium Development Goals. Second, we illustrate some of the common dilemmas faced when making ecosystem service management decisions and discuss some of the problems of using modeling results when examining ecosystem service trade-offs. Finally, we provide a framework for anticipating win–win, lose–lose, and win–lose outcomes as a result of how people manage their ecosystem services in the study area.

OuedEd-DahabBay (Moroccan Sahara, Dakhla): Biological values, dys functions and vulnerability

Mohammed Aziz El Agbani, AbdeljebbarQninba, OumniaHimmi, Mohamed Ménioui, Abdellatif Bayed& MohamedDakki
Research Teamforwetland management, Mohammed V-Agdal University, Scientific Institute, Rabat, Morocco.
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The Oued Ed-Dahab Bay, wetland open on the Atlantic Ocean in Moroccan Sahara, is a strategic enclave within the Palearctic region at the edge of tropical one. With an impressive landscape value, it has an area of about 400 km². It is due to its bathymetric features, its tidal phenomena and its high nutrient richness that the bay involves a natural process favoring high productivity and rich biodiversity. Thus the Oued Ed-Dahab bay encompasses high diversity and mosaic of natural habitats which include large phanerogam seagrasses and algal beds as well as large areas of intertidal habitats. It has the largest deposits of shellfish in the country with large economic interests. This bay is the richest and most productive intertidal wetland in Morocco with more than 32 species of amphipod crustaceans, 220 species of molluscs, 87 species of fishes, 85 species of bird including 6 species vulnerable, rare or threatened and an average number of 60,000 wintering waterbirds. It is also a rare Moroccan intertidal ecosystem hosting a remarkable population of marine mammals. His terrestrial border hosts 77 species of vascular plants including 18 endemic and herpetological community that include a large proportion of endemic species or relics.All these values together have made this site qualifying for several conservation status at national and international levels (Site of Biological and Ecological Interest, Important Bird Areas, Ramsar Site, Site of the Emerald network).

Based on these values, we propose a map of sensitivity and vulnerability of the Bay, available in four classes of sensitivity

and vulnerability by degree of importance of the natural habitat components and biodiversity. This is to prevent imminent risks of this wetland biodiversity values due to high pressures from the growing negative impacts of infrastructure projects, urbanization and tourism activities that could be established within this ecosystem.

Biodiversity in the Desert in Algeria Systems (the current situation, and use the configuration)

Dr. Ratiba Haurizi monotonous and Ngeraoa Dalila
Houari Boumediene University of Science and Technology
E-mail: unesco.algeric@live.fr

Algeria sits on an area of 2381740 km2 desert occupies 88% of the total area, which includes the south of the country. A major desert contains diverse landscapes of sand dunes and mountains, and specificities of drought caused by low rainfall, high temperatures and intense evaporation and wind permanent and dried doubled from water loss. Created climatic conditions and other environmental factors such as the nature of the rocks and soils and geomorphology diverse natural environmental scenes: race, slavery, Hamada, and mountains. These areas, there has been since ancient times, highly adaptable for each of the productive system and sociological and environmental factors on this established oases. The latter is characterized by a permanent presence of water and this has helped to develop and adapt agriculture and permanent concentration of population. Systems known desert weakest value of biodiversity compared to other systems. We find about 600 plant species, including 251 type home, these plants exposed to cruelty and climate change (drought continued leads to rapid deterioration of biodiversity and to split environmental regulations and a lack of the living environment) and over these natural factors influence human negative by grazing, disarmament herbs, agriculture, water pollution, etc.

To address this situation and to determine the impact of these factors there are some projects in the way of achievement and another under study, will have a positive impact for the protection of environmental heritage Desert and maintain it.

La Biodiversité dans les écosystèmes sahariens en Algérie (état, utilisation et réhabilitation)

Hourizi Ratiba et Nedjraoui Dalila
Laboratoire d'Ecologie et Evironnement
Faculté des Sciences Biologiques
Université des Sciences et de la Technologie Houari Boumediene

Séminaire de: « Biodiversity in desert area : Présent Status, Threats and Remediation »
Organisé par : ISESCO.
Rabat; Moroco
12 et 13 septembre 2012

SITUATION GÉOGRAPHIQUE

Située en Afrique du Nord, l'Algérie, occupant une superficie de 2 381 740 km². les régions désertiques couvrent plus de 80 % de cette la superficie.

Limites du Sahara

Limite septentrionale	Limite méridionale
limite de l'Atlas Saharien qui coïncide avec la limite sud de l'alfa : végétation steppique semi aride et aride	Passage de la végétation saharienne à la savane

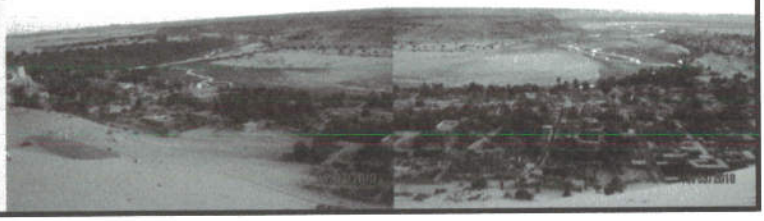
Climat Hyper aride caractérisé par:

- Des précipitations très faibles < 100mm et irrégulières,
- Des températures très élevées et de grands écarts thermiques: le maximum des températures en été est de 48 °C et en hiver la température est très faible -10 °C
- Une évaporation très forte
- Des vents continuels et asséchants qui accentuent le déficit en eau.

Ces éléments confèrent au Sahara un équilibre écologique très fragile

Les paysages du Sahara (hyper aride)

- **Les ergs**, massifs de dunes de grande étendue.
- **Les regs**, étendues plates, caillouteuses et graveleuses;
- **Les hamadas** plateaux rocheux;
- **Les djebels**, reliefs à haute altitude
- **Les oasis**, endroits particuliers où la présence de l'eau, a permis la croissance permanente de végétaux et l'installation des communautés humaines de façon durable.



La biodiversité saharienne

- Le milieu saharien renferme la plus faible richesse floristique du monde. Le nombre d'espèces est d'environ 650 espèces avec un endémisme remarquable de 251 espèces environ.

Sur Ergs et d'autres sols Sableux

Dominance de *Stipagrostis pungens* (Drinn) végétation arbustive dominée par *Genista Saharea* et *Caligonum Azel* et des plantes herbacées comme *Cyperus conglomeratus*

Sur regs substrat caillouteux ou argileux

Groupement à *Haloxylon scoparium* formant des pseudosteppes , pauvres en espèces

Sur regs argilo-sableux

Peuplements à *Aristida plumosa*
Cornulaca monacantha (chenopodiacée) associée à *Randonia africana*

Cornulaca monacantha

Randonia africana

Aristida plumosa

Hammada et sols rocheux

Groupements à *Fagonia glutinosa*
Dans ces milieux: présence d'une espèce endémique *Fredolia artioides*

Fagonia glutinosa

Fredolia artioides

Végétation des pentes et des falaises

Ce sont des milieux relativement riches :

présence des formations à *Limoniastrum feei* endémique du sud Oranais, dans les monts de Feguig et dans la région des Montagnes de Ougarta

Les saharo-sindiennes forment l'essentiel de la couverture végétale, elles se trouvent dans toutes les formations rupicoles du Sahara septentrional

Moricandia suffriticosa

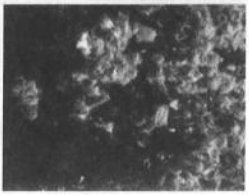
Senecio flavus

Perraldria coronopifolia

Aristida Adscensionis

Cymbopogon Schoenanthus

Lotus Roudarei



Forskaolea tenacissima

Dans les éboulis et aux pieds des falaises ou au bord des oueds, les arbustes tropicaux comme *Solenostemma Argel* et *Salvadora percica* et *Ficus salicifolia*

Solenostemma Argel

Salvadora percica

Ficus salicifolia

La végétation des dépressions

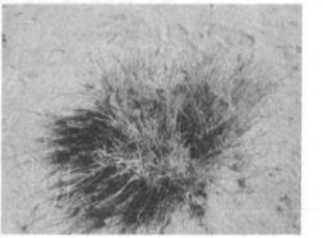
Pistachia atlantica

Ziziphus lotus

La végétation des dayas et dépressions fermées

Dans les vallées sèches à fonds limoneux on trouve des formations à steppes arborées à Acacia et à *Panicum turgidum*

Acacia Raddiana



Panicum turgidum

la strate arborescente comporte notamment: Acacia raddiana, Maerua et Balanites

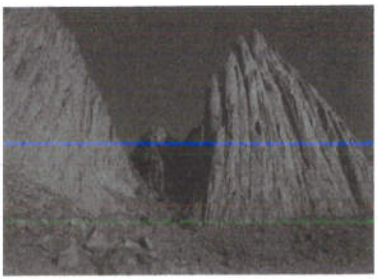
Balanites

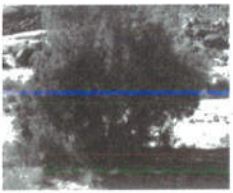
La formation arborée à *Tamarix articulata* (T. Aphylla) dans les vallées d'alluvions sableuses bénéficient d'une alimentation plus ou moins régulière d'eau comme la vallée de la Saoura

Tamarix articulata

Halocnemum strobilacium

Végétation saharienne d'altitude





Olea laperrini dans les parois granitiques, en altitude apparaissent les espèces de souche Méditerranéenne telles que le *Myrtus Niveilei*

Le cyprès du tassili espèce endémique et protégée

Cupressus dupreziana (tarout en tamahaq).

Les groupements hydrophiles

Les groupements hydrophiles sont constitués de végétation submergée comprenant le Potamogeton, Lemna, Urticularia puis une ceinture de roseaux à Thypha et phragmites , Sciperus et Erianthus passant à une tamariçaie.

Guelta de Tamekrest

Guelta d'Afilal.

La végétation cultivée des lits d'oueds et Vallées

Oasis de Tiout à la limite du Sahara septentrional

La population pratique un système agropastoral dans lequel la phoeniciculture est l'agriculture dominante.

Utilisation et menaces sur la biodiversité

➢ Arrachage des plantes pour la médecine traditionnelle et les combustions

Arrachage de l'armoise

Un arrachage abusif des espèces pérennes

LE SURPÂTURAGE

Effectif du cheptel dans le Sahara Central

	Hoggar		Tassili	
	1999	2009	1999	2009
Ovins	70 950	83 237	16 070	23 990
Caprins	61940	84 307	25 650	30 400
Camelins	69 370	83 599	17 910	23 491
Total	147 850	334 380	44 849	77 881

Sources Statistiques agricoles : 1999 et 2009

Les éleveurs semi nomades possèdent des troupeaux de petites tailles (moins de 50 têtes) composés essentiellement de caprins .

Menaces sur les agro systèmes

Le système oasien est menacé de rupture d'équilibre par :

- La croissance démographique et l'extension des villes,
- Le Changement des pratiques concernant l'utilisation durable de l'eau (système séculaire des foggaras menacé de disparaître)
- La surexploitation des ressources hydriques par la multiplication des forages

➢ La pollution des eaux par des rejets non contrôlés

➢ La salinisation des sols et remontée des sels

➢ La menace du bayoudh sur de nombreuses palmeraies, maladie vasculaire du palmier dattier due à un champignon du sol, Fusarium oxysporum f. sp albedinis qui figure en Algérie sur la liste A des organismes nuisibles.

➢ L'invasion acridienne affecte une superficie de 30.000.000 de Km2. elle peut périodiquement provoquer la destruction quasi totale des cultures. Cette invasion est localisée entre le 15° et le 45°N et Les principales zones de pénétration des criquets en Algérie sont le Mali, le Niger, la Mauritanie et le Maroc

Les mesures de sauvegardes de la diversité biologique en milieu désertique

- L'Algérie s'est dotée d'une législation très dense en matière de conservation des ressources biologiques.

SUR LE PLAN INSTITUTIONNEL

❖20 aires protégées ont été créées renfermant des écosystèmes et des habitats variés. Le Parc National du Tassili au Sahara Central a été déclaré patrimoine mondial de l'humanité par l'UNESCO

❖Mise en place du Centre National de Développement des Ressources Biologique chargé de la connaissance, du suivi, de la conservation et du développement du patrimoine biologique.

Lancement du programme: DEVELOPPEMENT DU SUD

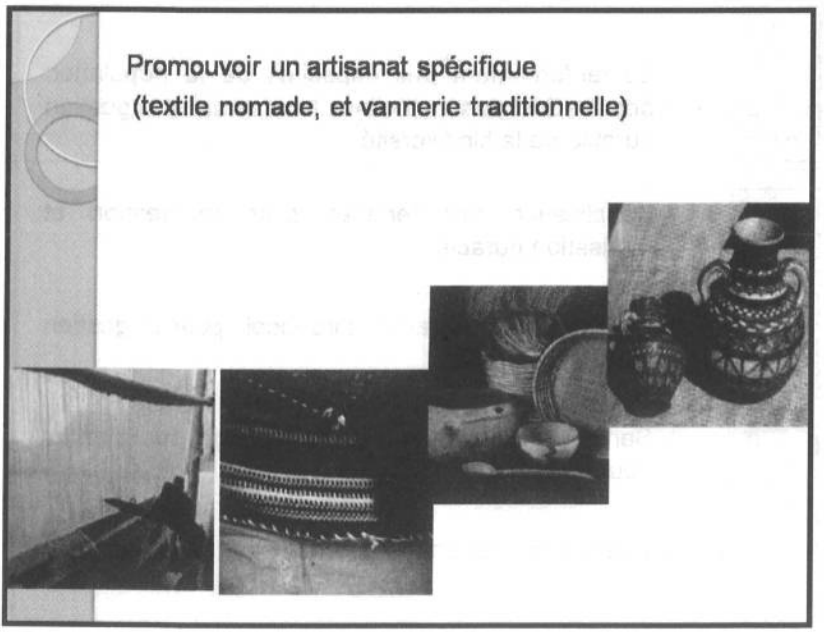
❖Lancement du **projet Sahara** (Adrar, Ghardaïa):

- ✓assainissement ;
- ✓forestation;
- ✓lutte contre la maladie du bayoud;
- ✓ Instauration d'un parc des déserts;
- ✓Mise en place poste graduation spécialisée dans le domaine des déserts.

33

- **La création de zones pilotes d'aménagement agro-sylvo-pastoral appelées Zones de Développement Durable (ZDD)**


Développement de l'Oasis de Timimoun (Adrar)
➢Aménagement et réhabilitation de 100 ha saturés de sels de la palmeraie
➢Mise en place du goutte à goutte
➢Sauvegarde et mise en valeur du Ksar
➢Réalisation d'un jardin botanique oasien sur 10 ha
Protection et sauvegarde du patrimoine naturel et culturel de l'Oasis qui renferme plus de 200 variétés de palmiers dattier


Promouvoir un artisanat spécifique
(textile nomade, et vannerie traditionnelle)

Conclusions

Pour protéger la biodiversité et promouvoir une utilisation durable des ressources sahariennes nous recommandons:

- Le renforcement des capacités de la population des ONG et des institutions locales dans le gestion durable de la biodiversité.
- L'implication des femmes dans la gestion et l'utilisation durable.
- La promotion du savoir faire local pour la gestion de la biodiversité
- Sensibiliser sur le mode d'arrachage des plantes pour tout usage
- Développer l'épuration des eaux par lagunage


Merci de votre attention

The Effects Of Climate Change On Agricultural Biodiversity

Dr Tarek Elfellah
University of Tripoli- Libya

Biodiversity

- Genetic Diversity : variation in genes enabling organisms to evolve and adapt to new conditions .
- Species Diversity : the number kind and distribution of species within an ecosystem .
- Ecosystem Diversity : the variety of habitats and communities of different species that interact in a complex web of interdependent relationships .

Agricultural Biodiversity

- ***Refers to the variety and variability of animals, plants, and micro-organisms on earth that are important to food and agriculture which result from the interaction between the environment, genetic resources and management systems and practices used by people.***

Food

- ***Basically, the diversity of food resources that human can cultivate from nature is more than adequate over the last few centuries.***
- ***Farmers have reared and cultivated more than 10,000 species for human consumption.***

Worldwide ,,,

- ***15 plant and 8 animal species provide 90% of food supplies worlwide ....***
- ***Rice , corn and wheat alone cover half of our food requirements .***

Lost ,,, according to FAO ....

- ***During the 20th century , ¾ of the genetic diversity of agricultural crops were already lost , due to the industrialisation of agriculture .***
- ***<u>In Africa :</u> of the several thousand plant species that have been used for food only about 150 are cultivated today and no more than 3 , rice , wheat and maize supply 60-80 % of the calories and protein derived from plants .***

FAO

- *Surveyed farm animals in 169 countries and found that 90% of the cattle in the developed world originated from only six breeds.*
- *These breeds imported by developing countries (for high yield) are actually poor adapted to local climate conditions and indigenous diseases.*

FAO

- Estimated that 20% of cattle , goats , horses and poultry are endangered by the adoption of high yield western animal breeds .
- There is a livestock meltdown underway across Africa , Asia and Latin America .
- gene banks are important to store semen, eggs and embryos of local animals in the developing countries .

Local vs exotic breeds

- *Over longer term , the imported breeds may not cope with unpredictable climate changes or outbreaks of indigenous disease .*
- *Local breeds or genes can do better .*

Food genetic basis

- *Agricultural companies in the developed world produce seed products alongside chemical ferilizers and pesticides , and dominate the world market .*
- *Agricultural companies gave us just a few , uniform plant varities and animal breeds at the expense of traditional and local varieties*

Biodiversity

- *Biodiversity has therefore been drastically reduced, and so, too our food genetic basis.*
- *The extent of this loss is especially obvious in the face of **global warming.***

Climate change and biodiversity

thru history ...

- *The climate of the earth has never been stable have been 4-5 C° cooler than now .and 1-2 C° warmer*
- *Ecosystems and species have moved, often freely in response to such past changes and have evolved within this climatic history*

Not only the climate change ,,,

- Agricultural biodiversity is under threat from multiple stresses :
  - ° climate change
  - ° Increasing land use conversion
  - ° pollution
  - ° Introduction of exotic nonnative species
  - ° biotechnology – genetic pollution

How climate change could affect parasites and pathogens for farm animals

- **Increased rate of development of pathogens and parasites.**
- **Due to spring arriving earlier and warm winters**
- **Allow greater proliferation and survivability of organisms. Example : Bluetongue was recently reported in Europe for the first time in 20 years**

(Baylis and Githeko 2006)

Climate change and genetic diversity

- *At the most basic level of biodiversity, climate change is able to decrease genetic diversity of populations due to directional selection and rapid migration, which could in turn affect ecosystem functioning.*

The Impact on crop yields and farm animals productivity will vary considerably:

- ***Tropics and subtropics regions will be threatened by climate change.(the poor countries)***
- ***Temperate and higher latitudes may benefit. (the rich countries)***

Effects on dairy cattle

In east-central USA

- **Milk production decline 4% for July-April , and 2.2 % for October –July .**
- **Cattle growth rate decline 26% during summer months, but increased 12% during the winter months as a result of global warming .**
- **High producing animals will most likely be affected to a greater extent by global climate change than low producing animals . (Genotype-environment interaction) .**
- **Hahn et al (1999)**

Conception Rate

- **Conception rate in dairy cows were reduced 4.6% for each unit change when the THI reaches above 70 (Hahn 1999).**
- **Decrease in pregnancy rate of 3.5% for each increase in average temperature above 23.4 degree .(beef cattle in a range system) Amundson et .al (2005).**
- **Increases in temperature and/or humidity have the potential to affect conception rate of domestic animals , not adapted to those conditions .**

In General .....

Environmental management for ruminants exposed to global warming needs to consider :

1- general increase in temperature levels .

2- increases in nighttime temperatures .

3- increases in the occurrence of extreme events :

hotter daily max. Temp.

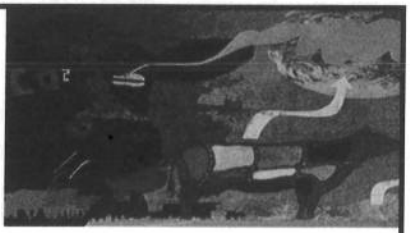
more longer heat waves

Ankole cattle,,,Uganda

Example : many experts predict that Ugandas indigenous Ankole cattle could be extinct within 20 years becouse they are being rapidaly supplanted by Holestien-Friesian breed

BUT : during recent drought , farmers who had kept their Ankole were able to walk them long distances to water sources , while those who have the imported breeds lost their entire herds .

Farm animals and climate change



At least a billion of the world's poorest people depend on animals for food, income, social status ,and security .

Long-term climate changes will jeopardize the future of all animal species and hence the poor farmers and countries .

Farm animals : a cause and a victim of the climate change ....

- As a cause : farm animals are major contributor to climate change , responsible for 18% of (GHG) emissions , 9% CO2 , 37% methane and 65% N2O .

- As a victim: climatic changes will have a negative impact on all animals , but particularly farm animals who are associated with certain activities that are directly contribute to climate change .

Influence of climate change on diseases and parasites that effect domestic animals ....

Bovine respiratory diseases are known to be increasing . (Duff and Gaylean .2007)

Insect migration and over –wintering , observed in cropping systems may be found for some parasites affect livestock.

Diseases .....

- ***Warming and changes in rainfall distribution may lead to changes in distributions of diseases sensitive to moisture : anthrax , blackleg , hemorrhagic septicemia and vector-borne diseases .***
- ***Diseases may decline in some areas and spread to others .***

Climate change and fisheries biodiversity

- Marine species have certain temperature ranges at which they can survive .
- Ex. Cod in north Atlantic requires water temp. Below 54F° . Now temp. In the region getting higher .

The outlook in Africa ,,, Summary

The results indicate that warming will be harmful to commercial livestock owners , especially cattle owners .

Owners of commercial livestock farms have few alternatives either in crops or other animal species .

Small livestock farms are better able to adapt to warming or precipitation increases by switching to heat tolerant animals or crops .

thank you ,,,,,,,,

International Conference on
« Conservation of biodiversity In the Desert Area : Present Statuts, Threats & Remediation ». 13th-14th september 2012.

سبخة إمليلي (إقليم وادي الذهب، المغرب)، نوع فريد من الأراضي الرطبة الصحراوية

Imlily Sebkha (Oued Ed-Dahab Province, Morocco), an original Saharan wetland

Abdeljebbar QNINBA
Research Team for Wetland Management
Mohammed V-Agdal University, Scientific Institute, Rabat, Morocco

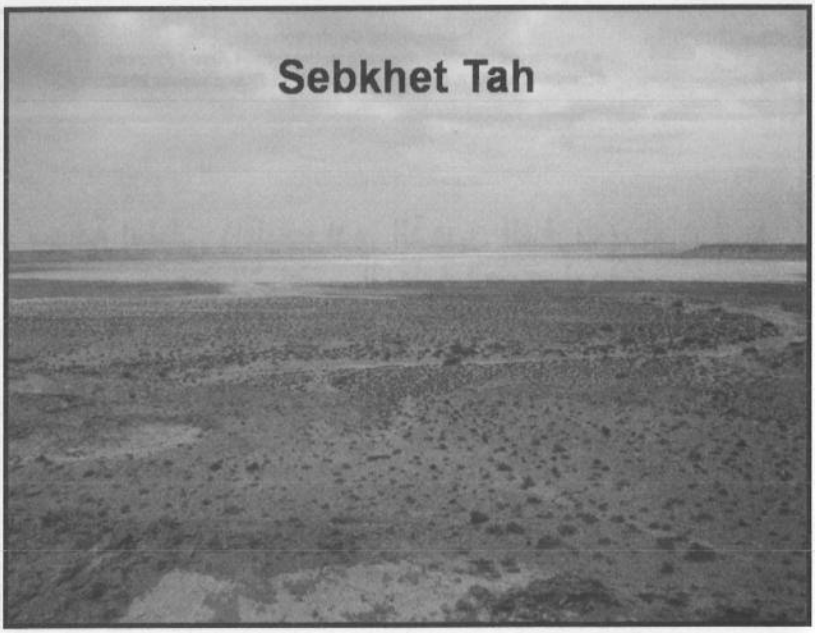
Definition of «Sebkha »

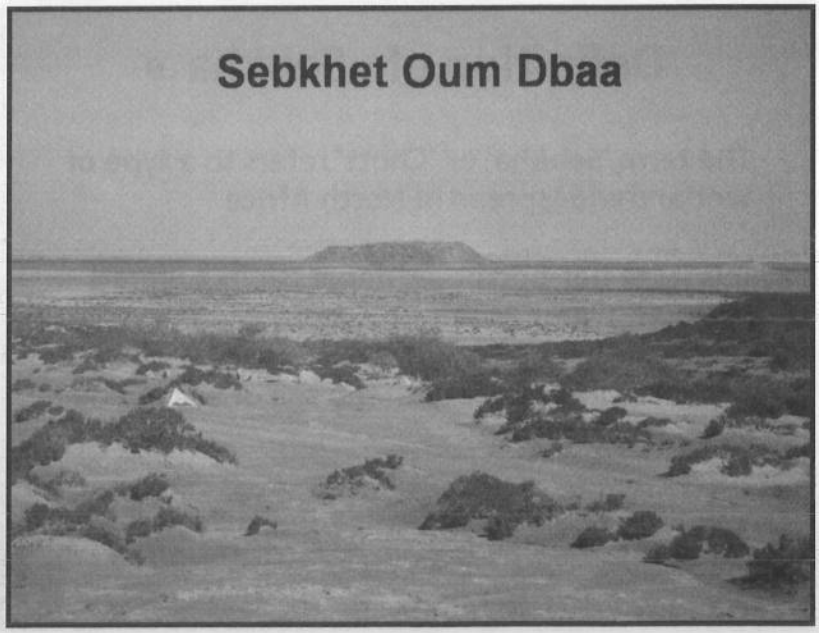
The term 'Sebkha' or 'Chott' refers to a type of wetland widespread in North Africa

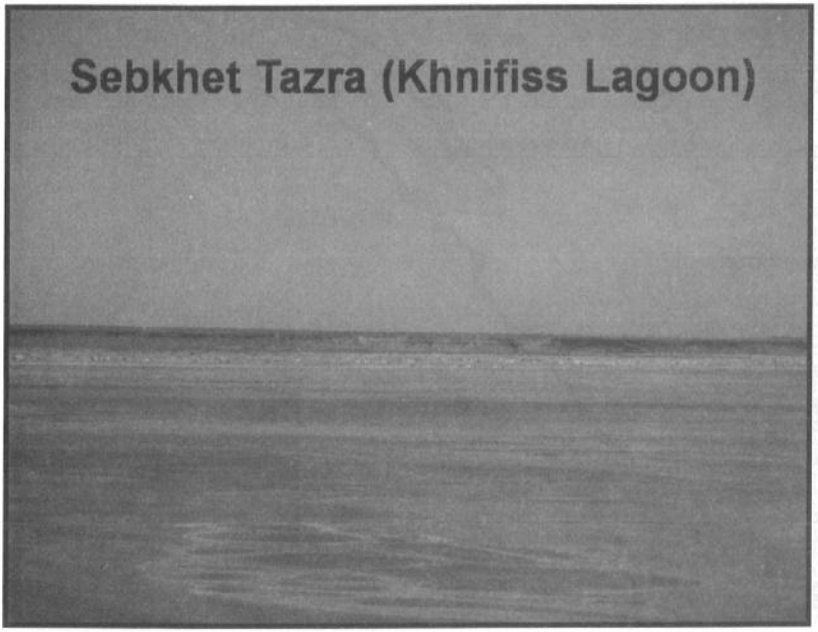
It is large flat-bottomed depressions covered with salt water or salt

Some communicate with the sea or are fed by streams or springs

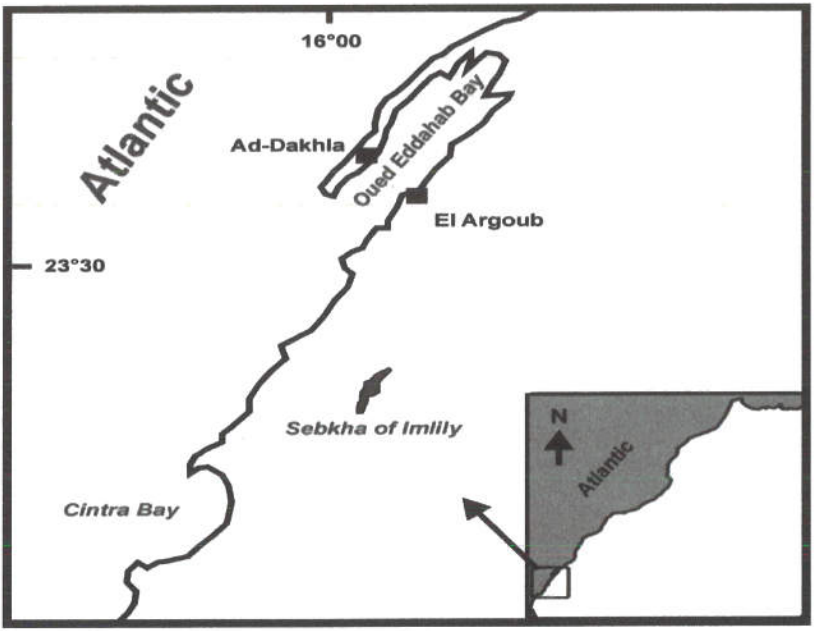
Others correspond to former marshes or lakes that are dry following the desertification


Sebkhet Tah


Sebkhet Oum Dbaa



Recently, a new type of Sebkhas was discovered in southern Morocco: a Sebkha of Imlily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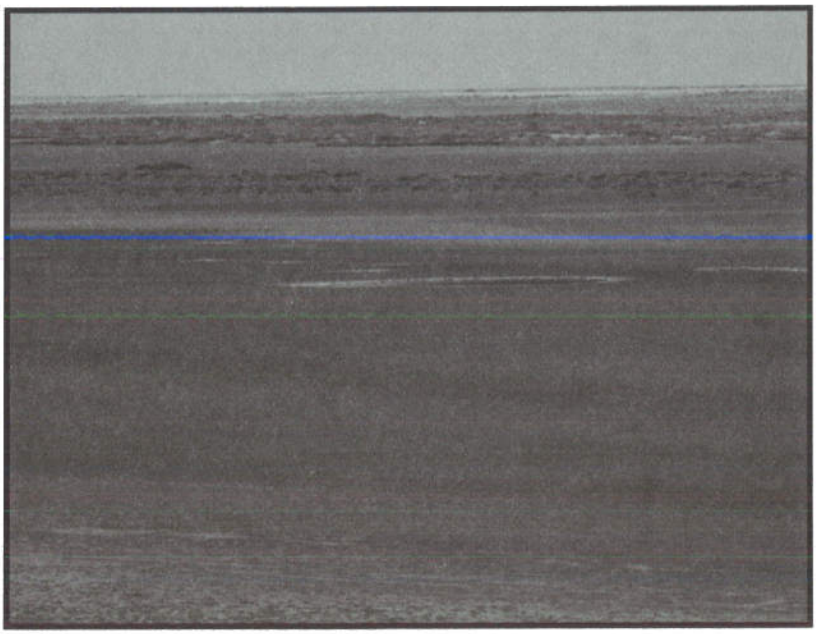
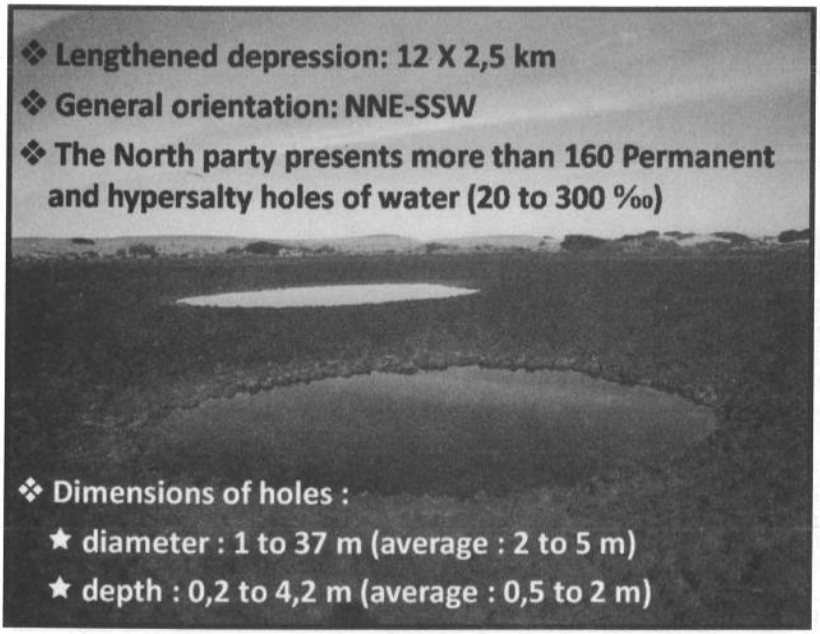
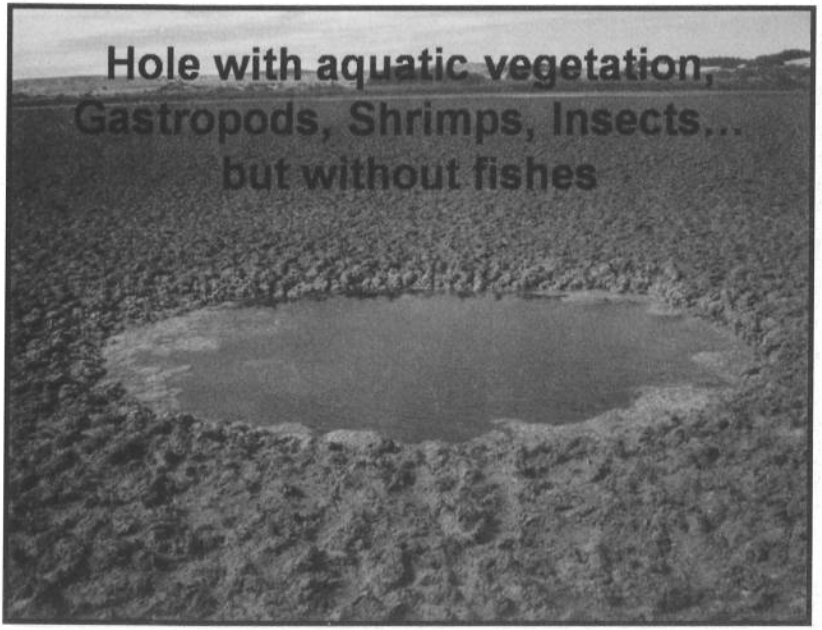
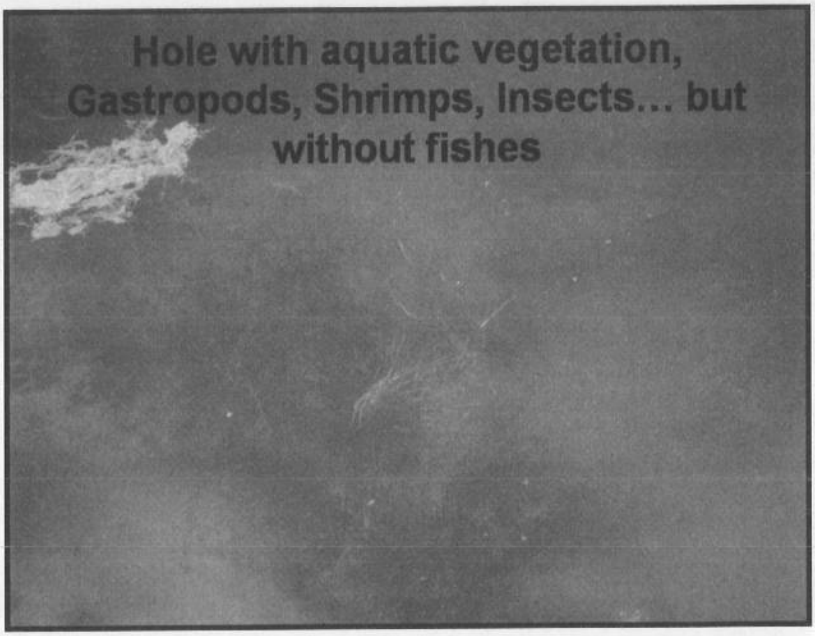
Atlantic
Ad-Dakhla
Oued Eddahab Bay
El Argoub
23°30
Sebkha of Imlily
Cintra Bay
N
Atlantic

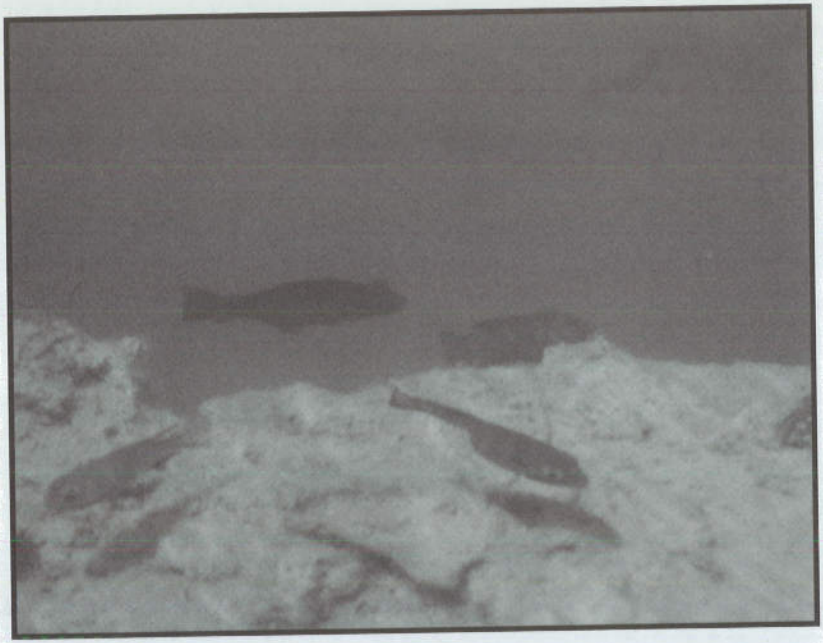


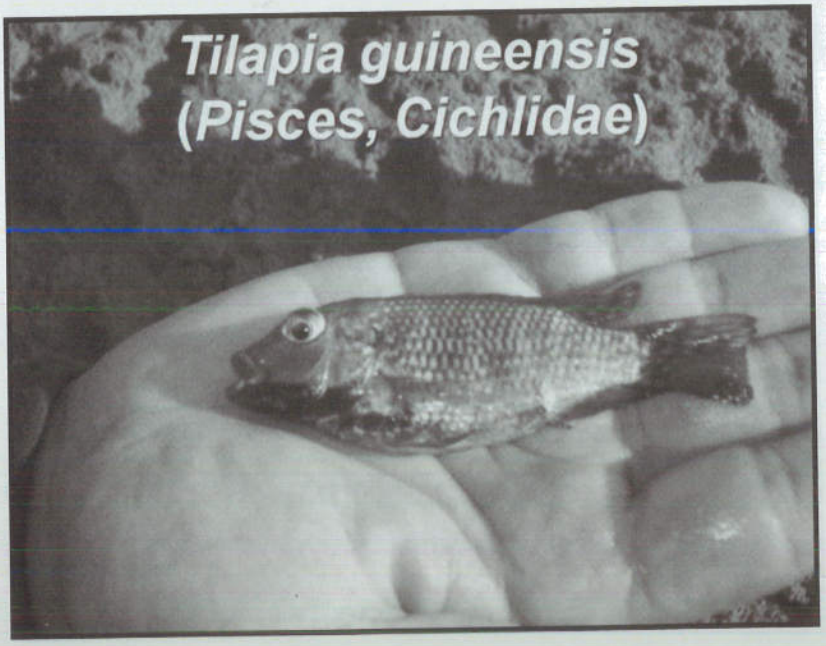

❖ Lengthened depression: 12 X 2,5 km
❖ General orientation: NNE-SSW
❖ The North party presents more than 160 Permanent and hypersalty holes of water (20 to 300 ‰)
❖ Dimensions of holes :
★ diameter : 1 to 37 m (average : 2 to 5 m)
★ depth : 0,2 to 4,2 m (average : 0,5 to 2 m)

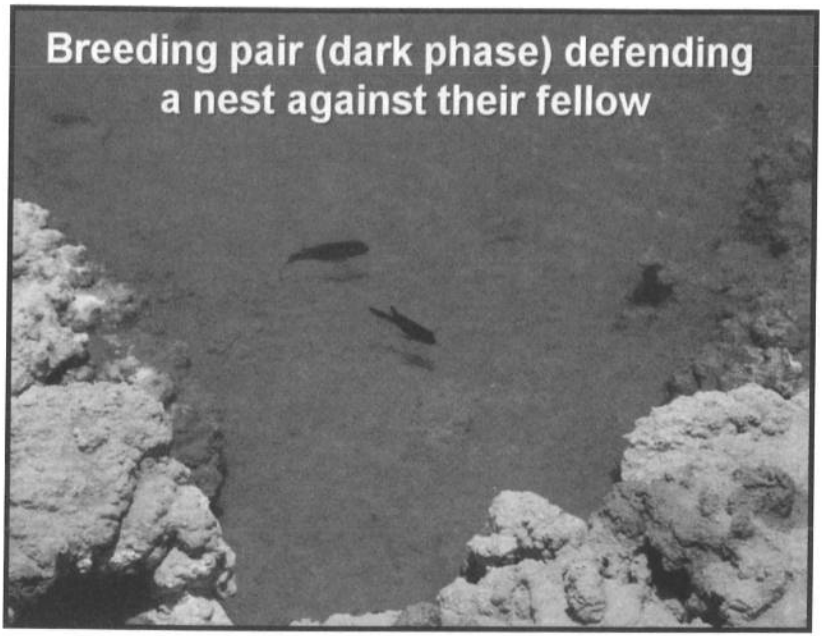

Hole with aquatic vegetation, Gastropods, Shrimps, Insects... but without fishes

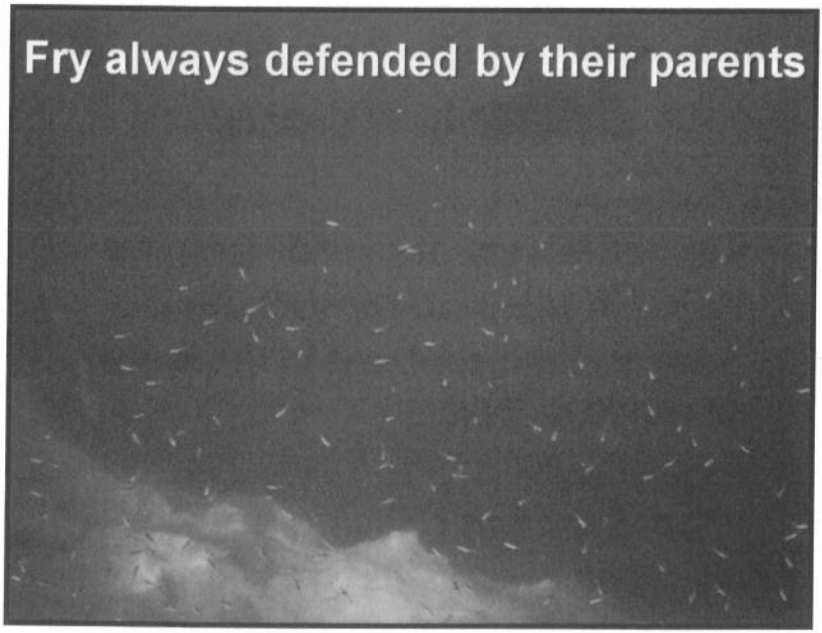

Hole with aquatic vegetation,
Gastropods, Shrimps, Insects... but
without fishes

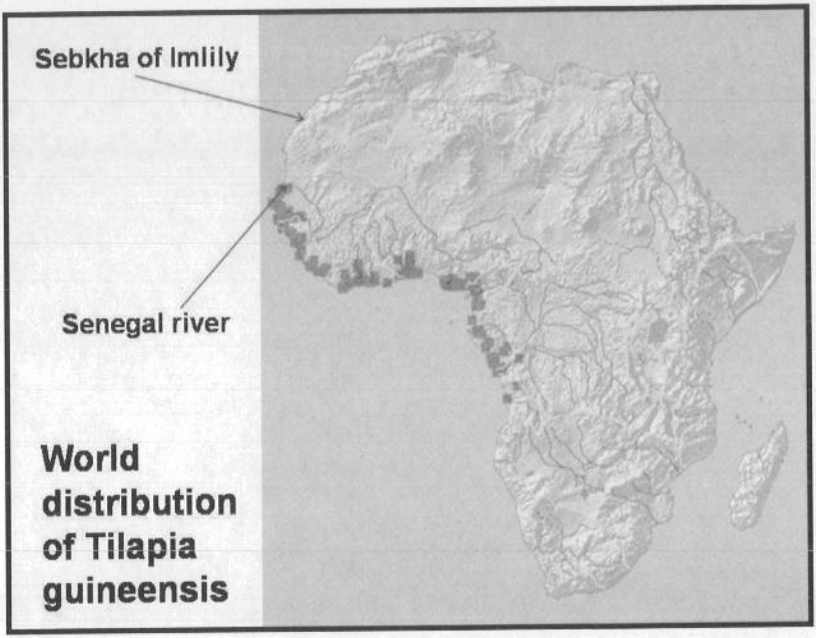

Hole with fishes




Tilapia guineensis
(Pisces, Cichlidae)


Breeding pair (dark phase) defending
a nest against their fellow

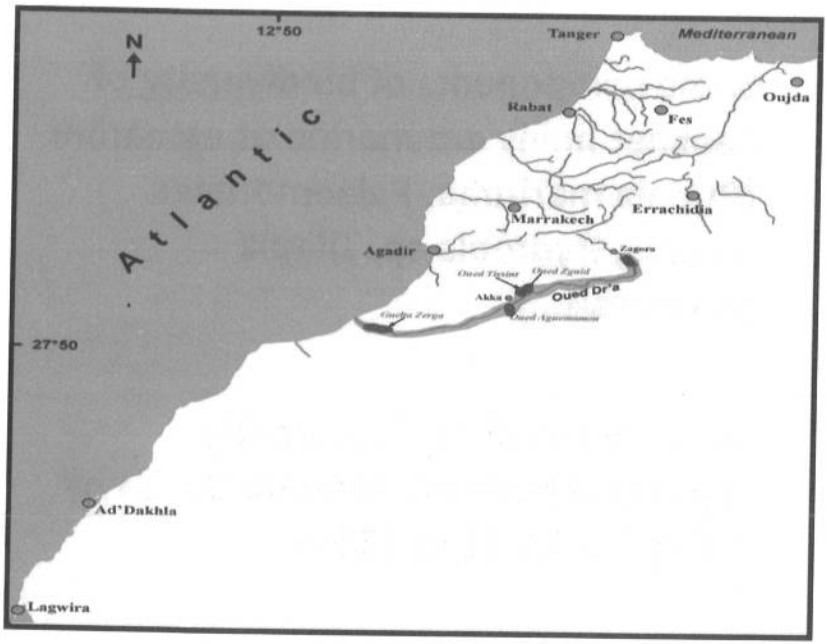

Fry always defended by their parents

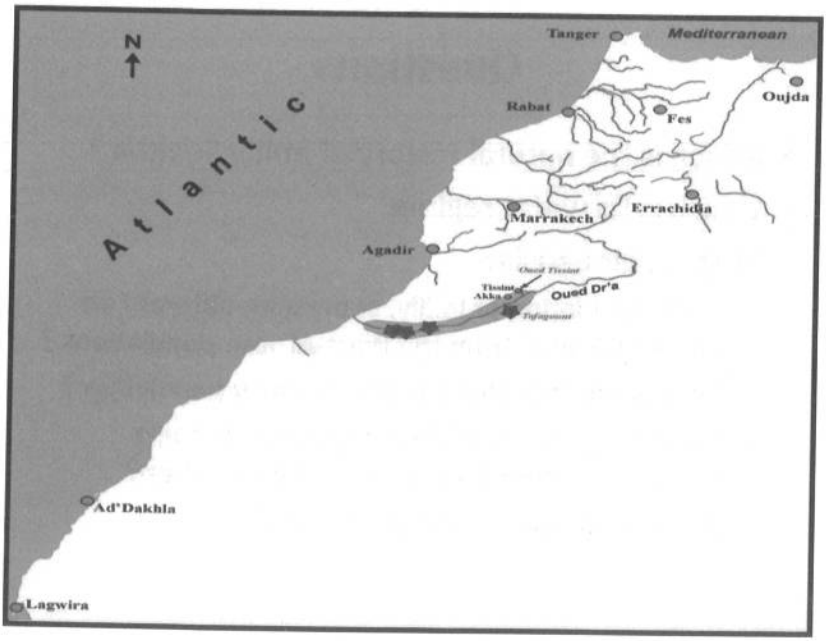


Reminder on the populations of cichlids in Morocco

The settlement of cichlids (tropical relics) in Morocco consists of two species, both confined in the basin of the river Dr'a:

- **Tilapia zillii**
- **Sarotherodon galilaeus**


N
12°50
Tanger
Mediterranean
Oujda
Rabat
Fes
Atlantic
Errachidia
Marrakech
Agadir
Zagora
Oued Tissint
Oued Zguid
Akka
Oued Dr'a
27°50
Ad'Dakhla
Lagwira


N
Tanger
Mediterranean
Oujda
Rabat
Fes
Atlantic
Errachidia
Marrakech
Agadir
Oued Tissint
Tissint
Akka
Oued Dr'a
Tifnigmount
Ad'Dakhla
Lagwira

Some components of biodiversity of Sebkhet Imlily are marine or estuarine (Ruppia maritima, Palaemonetes varians, Hydrobia sp, Tilapia guineensis...)

But Sebkhet Imlily is currently separated from the Atlantic Ocean by a distance of 12 to 15 km

Questions

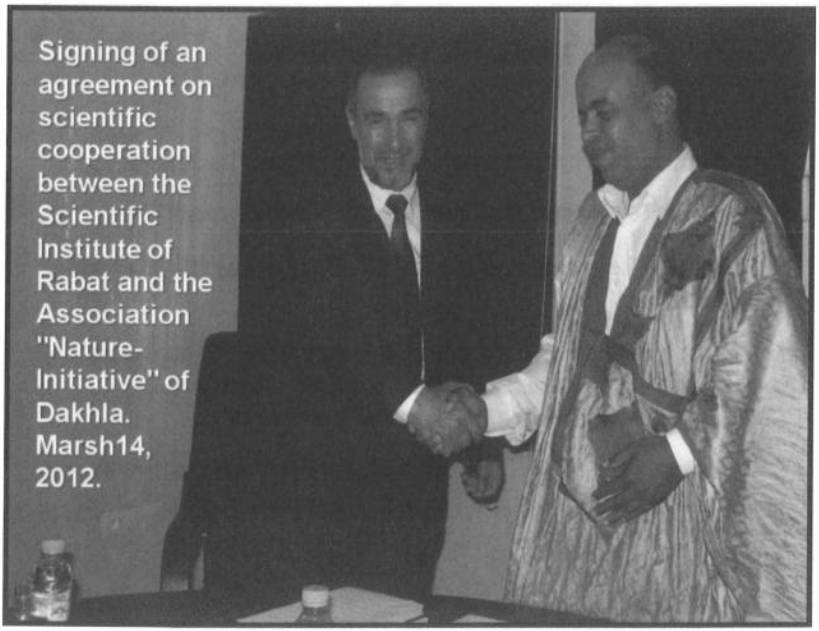
- **Which is the natural history of Imlily Sebkha ?**
- **Which is its water regime**
- **Tilapia guineensis :**
  - **Is the population of Imlily, at present, different on the genetic plan from the West-African populations ?**
  - **Since when lasts the isolation of Imlily population ?**
  - **Does the Imlily Population represents a single homogeneous entity or is it a meta-poplation?**
  - **Which is the diet of this population ?**
  - **...**

Setting up a project for multidisciplinary studies by

- Scientific Institute of Rabat (University Mohammed V-Agdal),
- Association « Nature-Initiative » of Dakhla

with funding from

- a state body development (Agency for Development and promotion of the southern provinces)
- local councils (regional, provincial and municipal)



Signing of an agreement on scientific cooperation between the Scientific Institute of Rabat and the Association "Nature-Initiative" of Dakhla. Marsh14, 2012.

Multidisciplinary studies initiated on Imlily Sebkha

❖ **General objective: To understand the genesis, function and evolution of a particular relic Saharan ecosystem, the Sebkha of Imlily (southern Morocco).**

Specific objectives

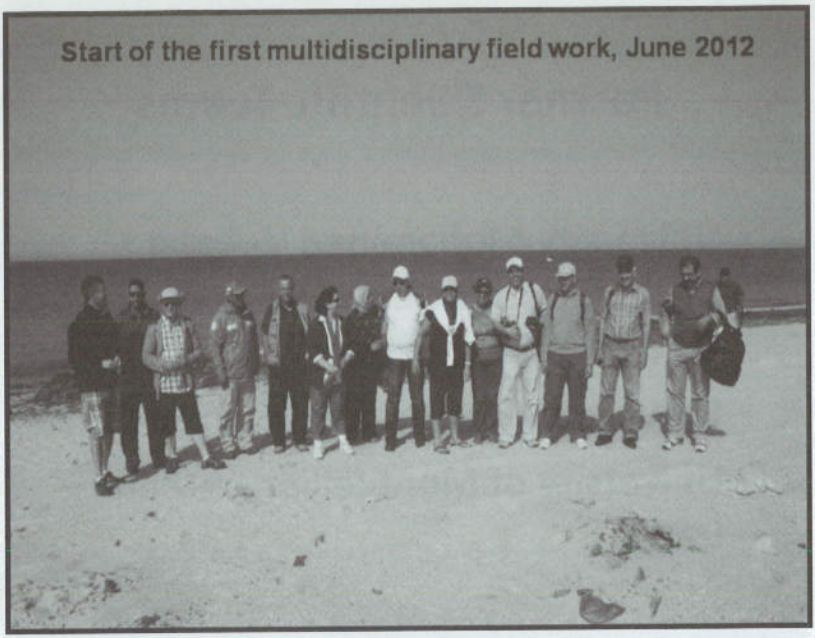
- **Understanding the hydrological functioning of the Sebkha.**
- **Studying its paleoclimatic and paleogeographic evolution.**
- **Identifying key components of biodiversity of the Sebkha and its surroundings.**
- **Making available to the authorities responsible for conservation of nature a complete diagnostic for classification and management of Sebkha Imlily as Protected Area.**
- **Developing the site on educational plans and eco-tourism as part of an integrated and sustainable development throughout the region.**

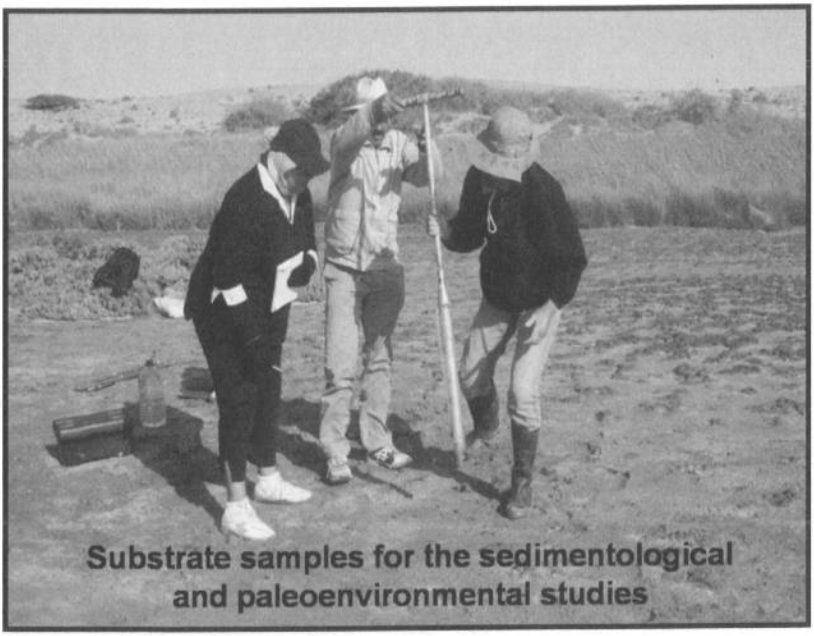
Partner Scientific Teams

- University Mohammed V-Agdal, Rabat (Scientific Institute and Faculty of Sciences)
- University Cadi Ayyad, Marrakech
- University of Montpellier (IRD and ISEM)

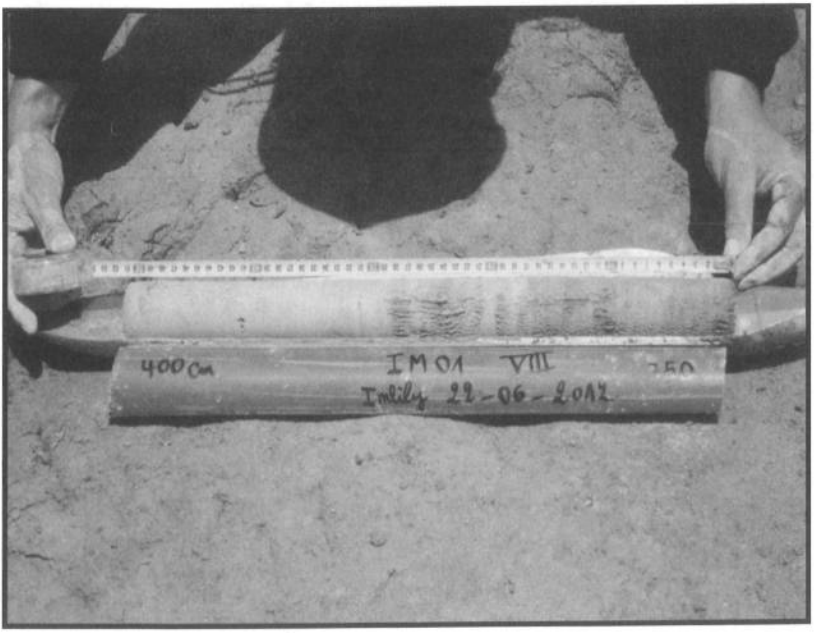
Thematics

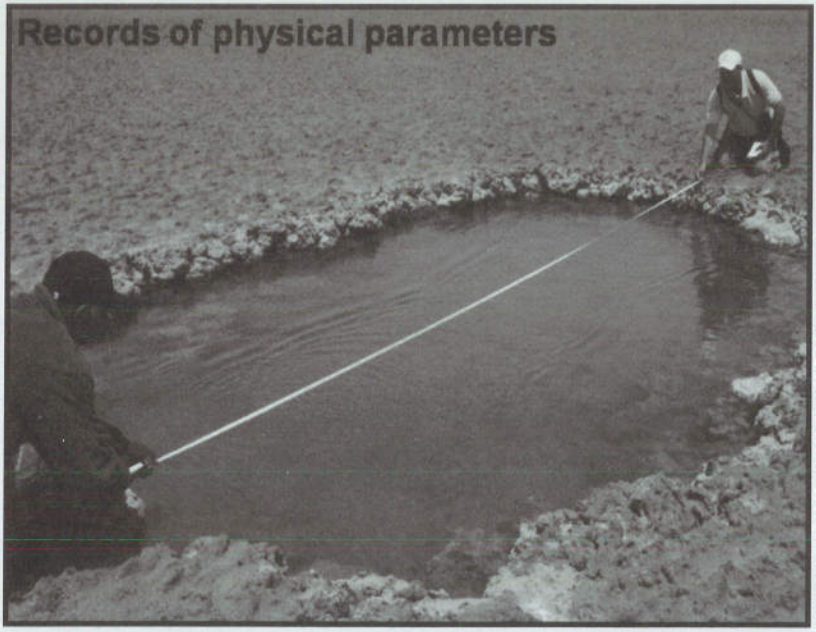
- Geomorphology
- Hydrology
- Teledetection
- Climatology
- Sedimentology
- Paleoenvironnement
- Hydrobiology
- Biodiversity
- Genetic
- Trophic relationships
- Diet
- ...

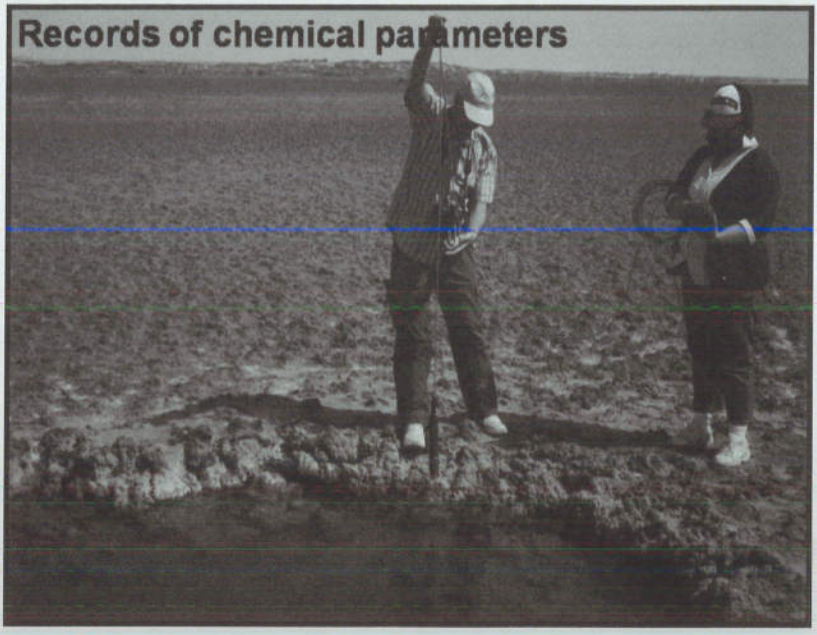

Start of the first multidisciplinary field work, June 2012

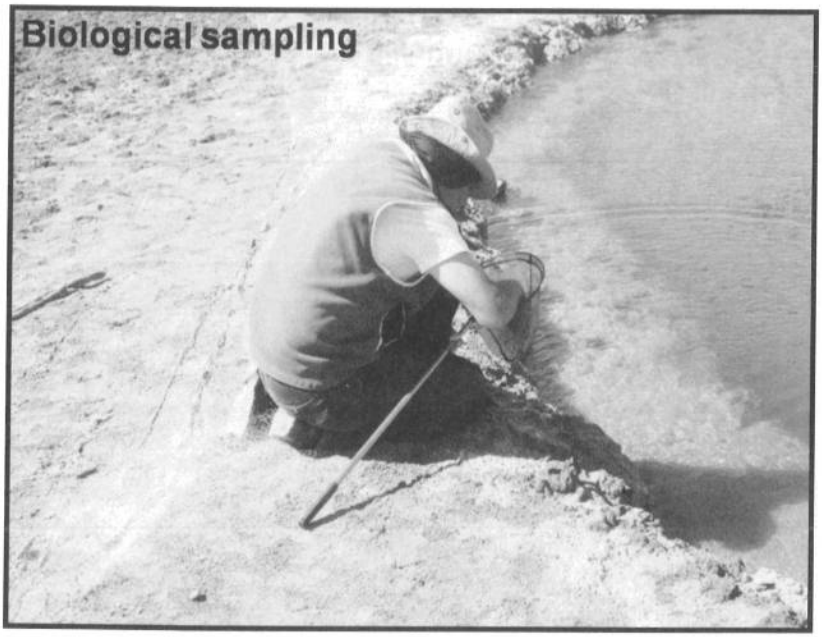


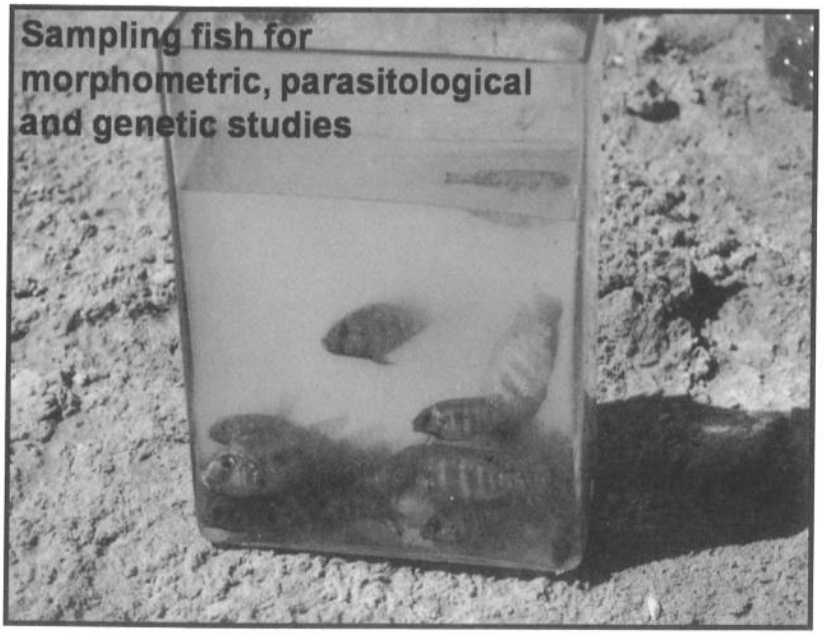
Substrate samples for the sedimentological and paleoenvironmental studies




Records of physical parameters


Records of chemical parameters


Biological sampling


Sampling fish for
morphometric, parasitological
and genetic studies


Thank you for your attention
شكرا على حسن تتبعكم

Radiation Technology for Preservation of Biodiversity

Dr. Shamshad Ahmed
School of Chemicals and Material Engineering,
NUST, Islamabad, Pakistan
E-mail: shamshad_zaki@hotmail.com

Burning fossil fuel in power plants to meet energy needs in developing countries is the biggest cause of acid rain causing deforestation at massive scale. This causes disruption of ecosystem, adversely affecting biodiversity through changing PH of the soil, disturbing the habitat of animals and soil organisms and can disturb rivers and lakes to a possibly lethal level. SOXs and NOXs generated on incineration of fossil fuel containing sulfur and nitrogen, chiefly responsible for acid rain, can be almost totally removed by employing electron beam accelerators, known as Electron beam flue gas treatment (EBFGT). Product is a fertilizer, highly nutritious for the soil. Conventional purification process employ gypsum to remove SOXs and NOXs from affluence generated in power plants producing a waste product which needs further disposal.. Plants are in operation in Japan USA, Canada and Poland. Factually it is a multi pollution treatment.

The coastal pollution originates from sea-food waste, produced in abundance due to exoskeleton waste from shrimps, crabs, lobsters etc which lies there to spoil and deteriorate. Fortunately this exoskeleton has 20 to 25 % chitin, the next most abundant globally found material after cellulose, which can be extracted and modified to produce chitosan, an antibacterial and antifungal compound. Its uses range from a use as an accelerator for the growth of crops, prolonging of shelf life of perishable fruits and waste water treatments and use in hydro gels which can cure third degree burns and thus save lives. Radiation processing of chitin and chitosan thus converts pollution into life saving drug. Several million tons of

such coastal waste may have the potential for improving biodiversity through drastic reduction of coastal pollution.

Radiation technology is the most efficient technique of reducing waste based on plastics, paper cardboard even wood pulp used to produce paper abundantly available in the countries of interest. Miscellaneous other applications encompass destruction of pollutants such as dyes, pesticides, poly aromatic hydrocarbons, toxic solvents destroying biodiversity. Its applications extend to radiation sterilization of municipal sludge and waste water, issues which plague the under developed region more than the advanced countries especially for countries with poor economy we are referring to in this conference.

RADIATION TECHNOLOGY, A REMEDY FOR PRESERVATION OF BIODIVERSITY

PAPER PRESENTED BY
DR. SHAMSHAD AHMED, SCME, NUST
RABAT CONFERENCE 13TH – 14TH SEPT '2012

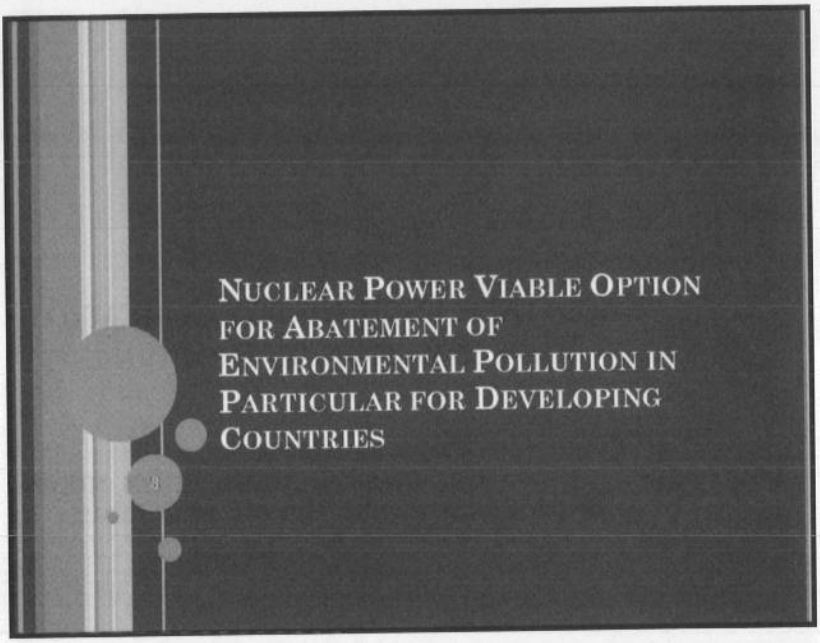
1

SUPERFICIAL TREATMENT VS PERMANENT CURE

- PAINT THE LEAVES GREEN
- SPRAY NUTRIENTS ON THE LEAVES
- PROVIDE NUTRIENTS TO THE ROOT

Tree with decayed leaves

2



FOSSILS FUELS, ENVIRONMENTAL IMPACT

- Global Warming
- Air quality deterioration –SOXs, NOXs-smog
- Acid rain – deforestation -desertification
- Coal ash, slag, abatement residues induced toxic waste contamination
- Oil Spillages – marine and coastal pollution
- Land spoilage
- Extensive fuel transportation of non renewable resource
- Depletion of non renewable resource

HYDROELECTRIC

- Large scale displacement of population
- Loss of fertile land
- Ecosystem disruption and health effects
- Biodiversity losses
- Colossal losses in the event of dam failure
- Tremendous job of decommissioning

RENEWABLES - (BIOMASS, SOLAR, WIND GEOTHERMAL)

- Air quality degradation (geothermal biomass)
- Extensive land utilization(wind) land disputes Pakistan ,Karachi
- Ecosystem disruption/changes
- Impact of industrial fabrication (solar photovoltaic cells)
- Wind – noise pollution-abatement, Australia (Denmark)

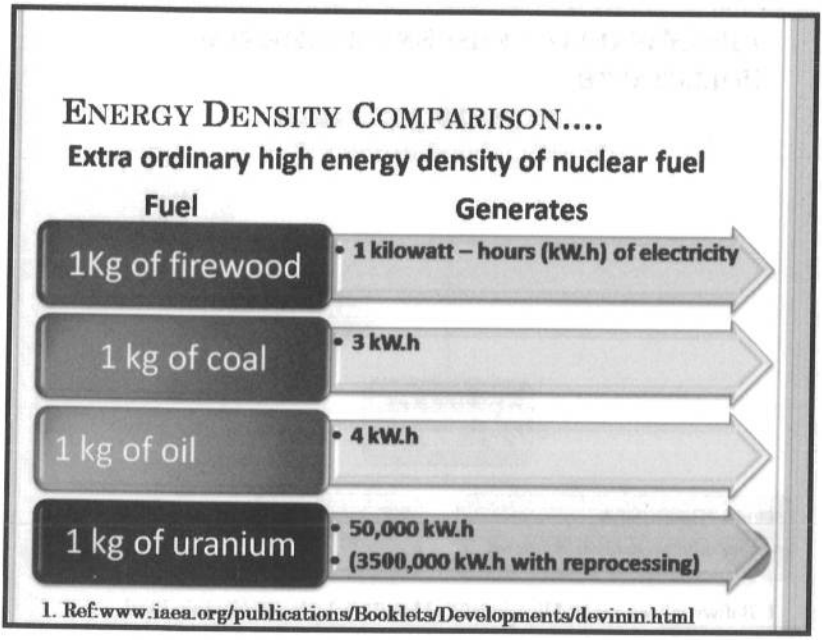
1000 MW (E) System Land Utilization Comparison

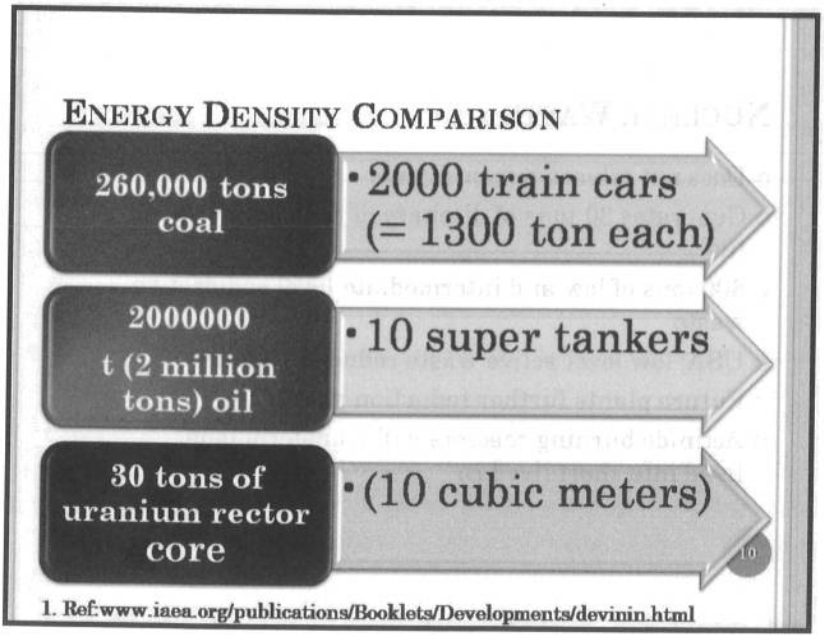
- Fossils thermal nuclear sites: 1-4 km^2
- Solar thermal or photovoltaic: 20-50 km^2 (a small city)
- Wind flow: 50-150 km^2
- Biomass plantation: 400-600 km^2

1.Ref:www.iaea.org/publications/Booklets/Developments/devinin.html

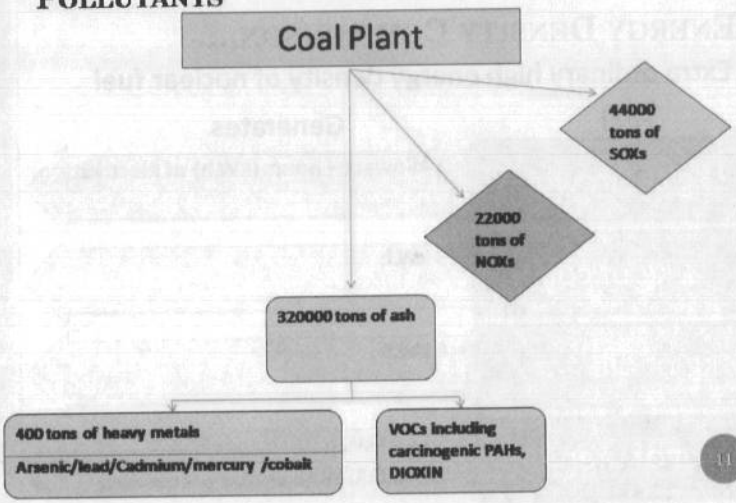
Energy Density Comparison....

- Energy density is the amount of fuel used to produce a given energy
- Measure of the magnitude of environmental detrimental impact
- A nuclear aircraft can circle the globe for 30 years, ordinary fuel fed aircraft would need refueling after 3000 miles


ENERGY DENSITY COMPARISON....
Extra ordinary high energy density of nuclear fuel
Fuel
Generates
1Kg of firewood
• 1 kilowatt – hours (kW.h) of electricity
1 kg of coal
• 3 kW.h
1 kg of oil
• 4 kW.h
1 kg of uranium
• 50,000 kW.h
• (3500,000 kW.h with reprocessing)
1. Ref:www.iaea.org/publications/Booklets/Developments/devinin.html


ENERGY DENSITY COMPARISON
260,000 tons coal
• 2000 train cars (= 1300 ton each)
2000000 t (2 million tons) oil
• 10 super tankers
30 tons of uranium rector core
• (10 cubic meters)
1. Ref:www.iaea.org/publications/Booklets/Developments/devinin.html

1000 MW (E)SYSTEMS: ENVIRONMENTAL POLLUTANTS



1. Ref:www.iaea.org/publications/Booklets/Developments/devinin.html

NUCLEAR WASTE

- Does not release noxious gases
- Generates 30 tons of discharged radioactive spent fuel
- 800 tons of low and intermediate level radioactive waste
- USA: low level active waste reduced 10 fold
- Future plants further reduction possible
- Actinide burning reactors will transform long lived into short lived (2)

GREEN HOUSE GASES EMISSIONS

- 6000000 (6 million)tons of CO_2
- No adequate viable technology available to abate or segregate the large quantities emitted.
- Countries with significant nuclear power and hydroelectric capacity have achieved significant lower emissions/unit of energies produced.
- France – Reduction of 80% in last 30 years

HUMAN DISRUPTION INDEX

FLOW ITEM	NATURAL BASELINE FLOW	HUMAN DISRUPTION INDEX	MAJOR CAUSES
LEAD	25000(t/a)	15	Fuel burning
OIL OCEANS	500000(t/a)	10	Oil processing and wastes
CADMIUM	1000 (t/a)	8	Associated processes
SO_2	50 million (t/a)	1.4	Fuel burning
METHANE STOCK	0.8 ppm	1.1	Agriculture activities
MERCURY	25000 (t/a)	0.7	Associated processes
NITROUS OXIDE	10 million (t/a)	0.40	Agriculture activities
Particle	500 million (t/a)	0.25	Fuel burning activities
CO_2	280ppm	0.25	Fuel burning

CONS (NUCLEAR POWERS)

- Nuclear plants expensive to build
- Proliferation concerns –terrorist threat
- Safety concerns –
  - **Man made mischief, Natural tsunamis, earthquake, and hurricanes**
  - **Mishaps of nuclear plants can transform hundreds of square miles of land into uninhabitable areas and render them unsuitable for years**
  - **Kills entire coastal systems and river system**
- Nuclear waste disposable still a problem

15

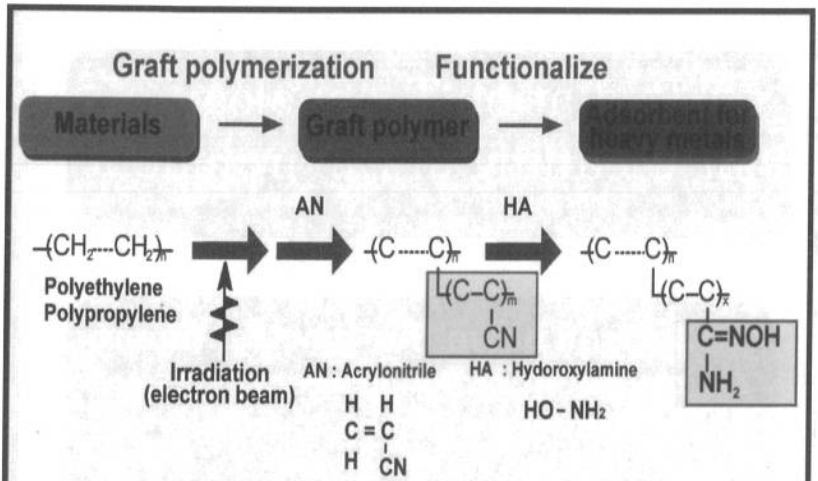
NEW DEVELOPMENTS

- New reactors have been made to make it physically impossible to melt down. As the core gets hotter, reaction tends to become slow
- Theoretical reactors (travelling wave) are proposed to eliminate entirely any long lived nuclear waste
- Planned theoretical thorium reactors based on thorium fuel don't produce weapon grade nuclear materials. Nothing novel. India has plans to build thorium based reactors. Has 50% of world`s thorium reserves

16

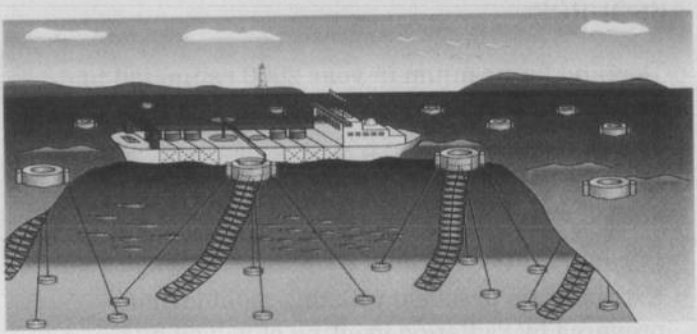
URANIUM IN OCEANS: A PROMISING RESOURCE

- Demand for uranium in year 2000 estimated to be 2.5×10^5 tons
- World's oceans contain 5×10^9 tons
- Concentration 3 μg/ liter at a salinity level of 35%
- Present as stable uranyl tricarbonate complex
- Extraction is practical utilising an aldoxime prepared by radiation grafting of polyolefins



Synthesis of adsorbent for heavy metals by radiation-induced graft polymerization

URANIUM EXTRACTION



In ocean : U of the order of several million tons

U in sea water 45 billion tons

3.3 mg/m³

Tricarbonate uranyl complex

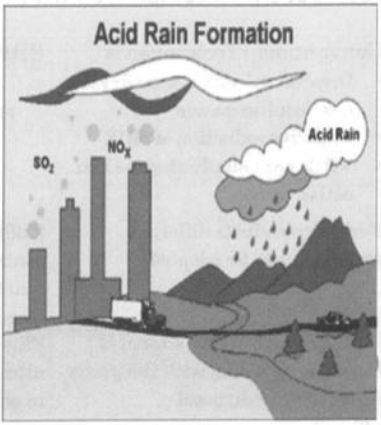
Radiation Technology for Cleaning of Environment

1. Electron beam flue gas treatment
2. Treatment of sewerage wastes
3. Treating waste from natural polymers (sea food waste)

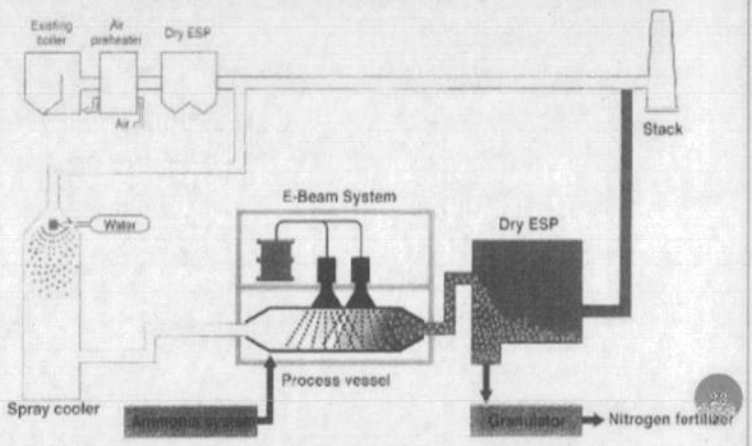
Abatement of Acid Rain by Radiation Technology Major Cause of Deforestation, Desertification

21

Major sources of SOX's and NOX's



ELECTRON BEAM FLUE GAS TREATMENT



MERITS OF EBFGT PROCESS OVER CONVENTIONAL TECHNOLOGIES

Competitive in comparison with the conventional process

Conventional Technologies	EBFGT Process
• Involves selective semi dry flue gas desulfurization • Selective reduction of NOX • VOCs are usually absorbed on active carbon	• EBFGT simultaneously removes all those
For different fuels different process has to be adopted	EBFGT applied for air pollution control in case of different fuels; coal lignite, heavy fuel oil, municipal waste
Final product: Waste adduct of limestone, gypsum with the gases - needs further disposal	Final product: Super ammonium nitrate, ammonium sulphate used in preparation of NPK

ELECTRON BEAM FLUE GAS TREATMENT

Coal fired boiler	China	Desulfurization
Coal fired boiler	Poland Electro power Station	Simultaneous removal of SulphurO_2 and NO_x from flue gas VOCs, PAHs, Dioxin
Lignite fired boilers	Bulgaria (pilot plant)	High Sulphur and high humidity
Copper smelter process	Poland Plant	15% high concentration of SO_2
Municipal waste	Takahama Clean Center Japan	Dioxins/PAHs Emissions (90% Decomposition)
VOC_s from mobile combustion sector, petroleum	Japan, Germany, USA, South Korea	Ozone/aldehydes H_2O_2, decomposed

25

6. Ref: Ahmed A. Basfar et al, Nucleonika, 55 (3) 271-277, 2010

RADIATION PROCESSING OF SEA FOOD WASTE: CLEANING OF COASTAL POLLUTION

26

Shrimp Lobster Crab

ALL GODS CREATION HAVE A ROLE

- Rodent resistant wire utilizing urine of lions
- Snakes venom as antidote for many diseases
- Outer skeleton of all sea animals has chitin the second most abundant polymer
- Few billion tons of this waste is available on the coast.

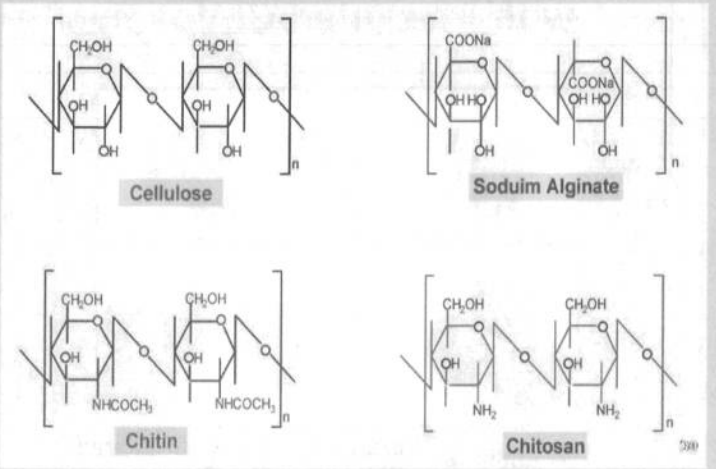
ABUNDANCE OF CHITIN/RADIATION PROCESSING

- Chitin is the exoskeleton of sea creatures
- Next to cellulose in abundance.
- Radiation degraded chitin/chitosan can induce various kinds of bio-activities

BIODEGRADABLE NATURAL POLYMERS

1. **Chitin/chitosan have unique characteristics solution properties, membrane forming, and metal chelation, applications limited due to the low-suitability in water, need to enhance their solubility and water uptake for various applications**
2. **Radiation processing can modify molecular weight, hydrophilicity and mechanical properties either by direct irradiation or by grafting suitable polymeric segments on their backbone without using any toxic initiator/product in their backbone.**

Structure of Sodium Alginate and Chitosan



APPLICATIONS (4)

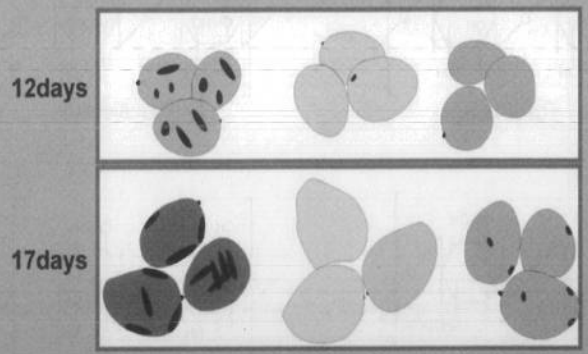
Agriculture:

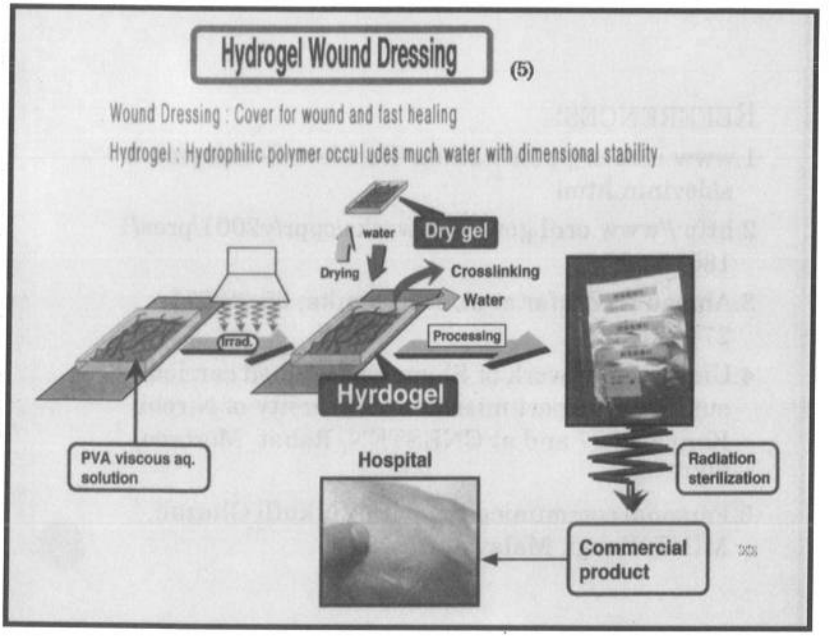
- Growth promotion of plants
- Suppression of heavy metal stress on plants
- Anti microbiological activities etc, seed encapsulation, prolonging shelf-life of perishable foods

Medicine:

- Hydrogels-dressing of third degree burns saves lives
- Controls elevation of cholesterol
- Undergarments, antibacterial, foul smell

Storage Test of Mango Coated with Irradiated Chitosan (4)





RADIATION TECHNOLOGY- INHERENTLY GREEN PROCESS

Radiation Process involving non-chemicals	Industrial Economic Scale	Counterpart conventional chemical industry
Radiation X linking of cable/rubber/foam/heat shrinkable	1000 billion US $ industry/ Japan, US, Europe, South Korea	Peroxides, high polluting explosives
Radiation sterilization of medical disposables spices/perishable foods	500 billion US $ industry/ Japan, US, Canada, Europe	Ethylene oxide gas highly corrosive, carcinogenic
Radiation disinfection of waste sludge, EBFGT (produces fertilizers)	China, Poland, US Emerging technology	Gypsum/ Lime/ Bleaching agents, serious disposal problems, VOCs, PAHs Dioxin
Radiation curing of wood, titles (uses only co-agents 0.1%)	Japan/Europe, China, Malaysia	Utilizes obnoxious solvents carcinogenic curing agents

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National Parks and Biodiversity in Libya

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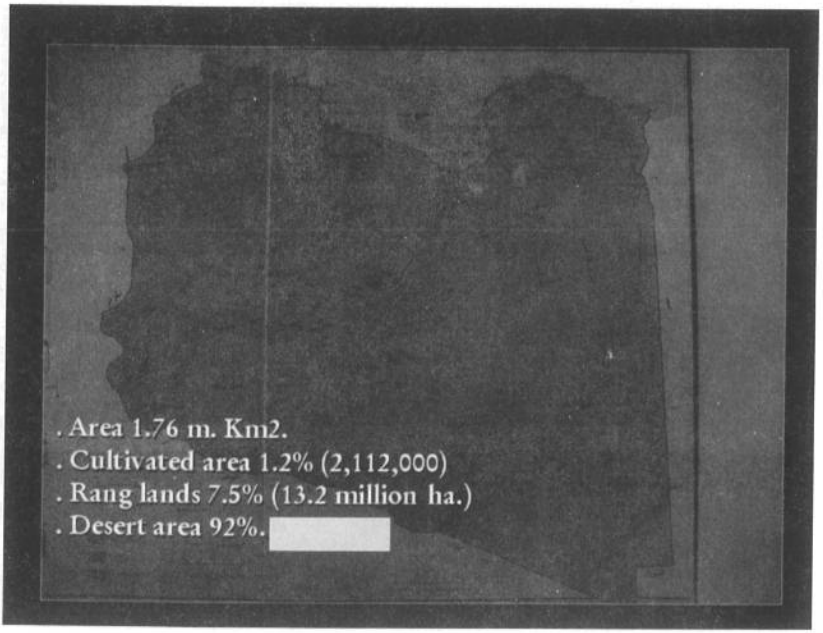
Almagrabi Soad
National Board of the Scientific Research

The International conference on Conservation of Biodiversity in the Desert Areas
Presents, Status Threats and Remediation
Rabat, Kingdom of Morocco

13th - 14th September 2012



Climate classification.

Classification	Rain fall mm/y	Area %
Semi tropical	500	0.01
Semi arid	300 - 500	0.10
Dry	100 - 300	5.0
Semi desert	50 - 100	7.0
Desert	50	88.0

Major habitat types.

The country can be divided into some of habitat types as:

. Algafara plain.

Continue along the western coast with varying width from place to anther while the width continue for some Kms. From the sea cost near Alhoms , 120 Km. east Tripoli, it reaches up to 100 Km. to the south at its western part.

. Coastal strip.

Nnarrow strip of sandy land along the sea coast, with some marshes when sea water interfere with coastal lands as in the areas from Sobrata to Tunisia borders in west part and Tawerga in midel part of the cost.

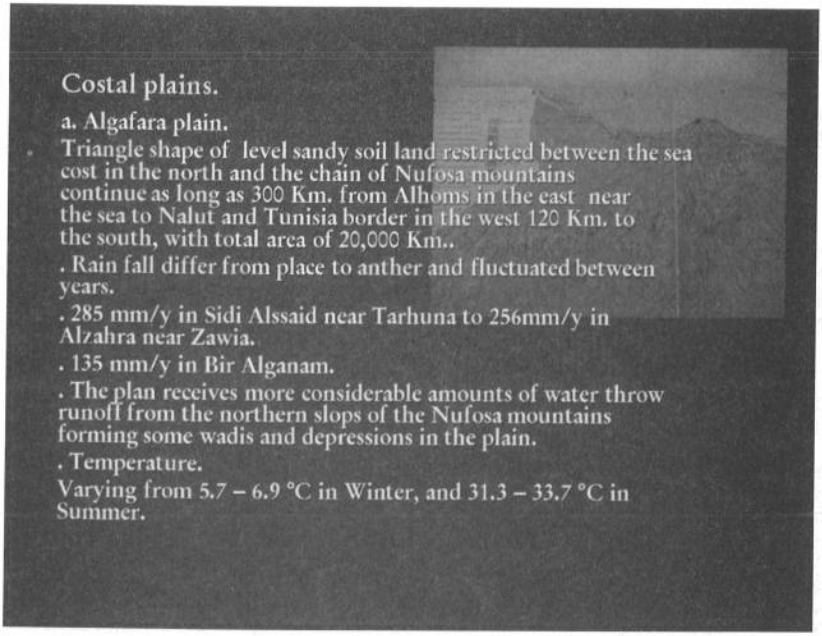
- Annual rain fall.

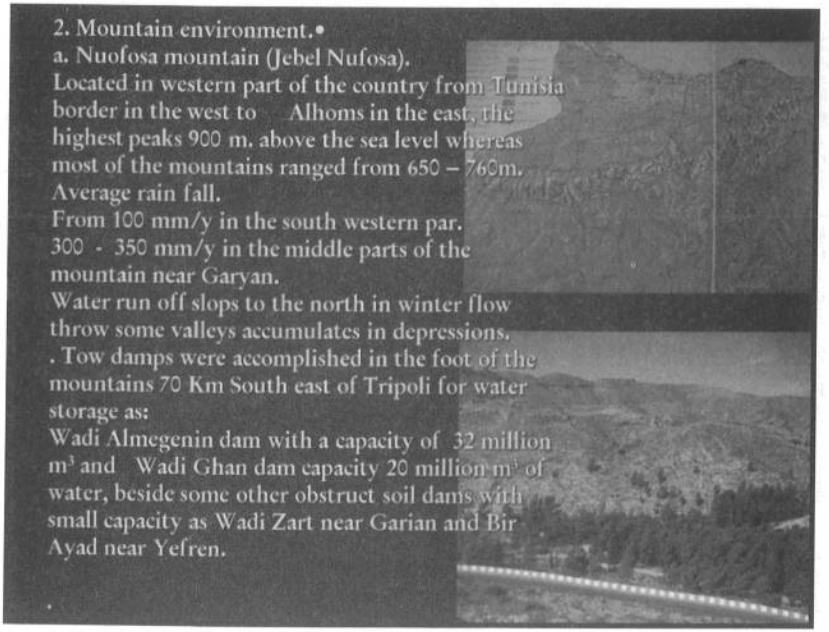
.Zuara to Musrata 200 – 300 mm/y.

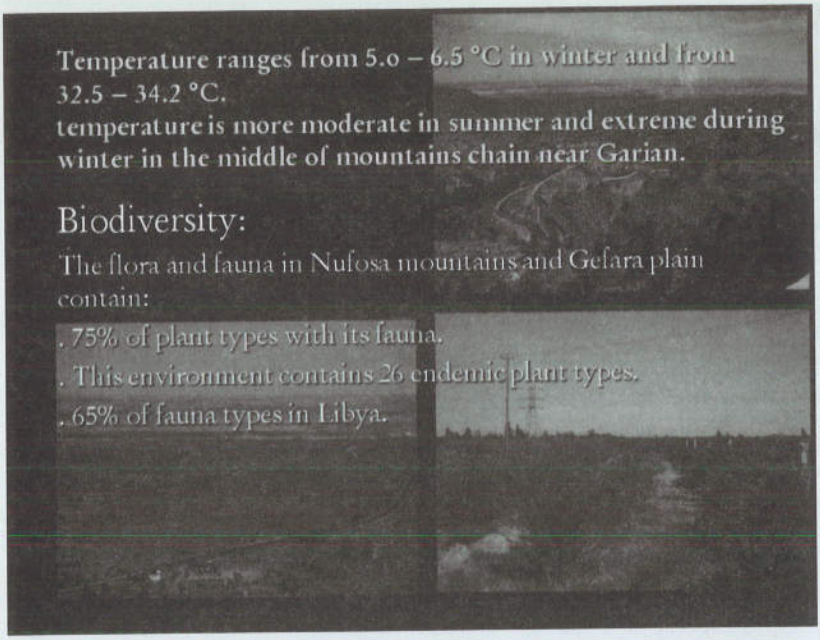
. East of Musrata to west of Sirt 150 mm/y.

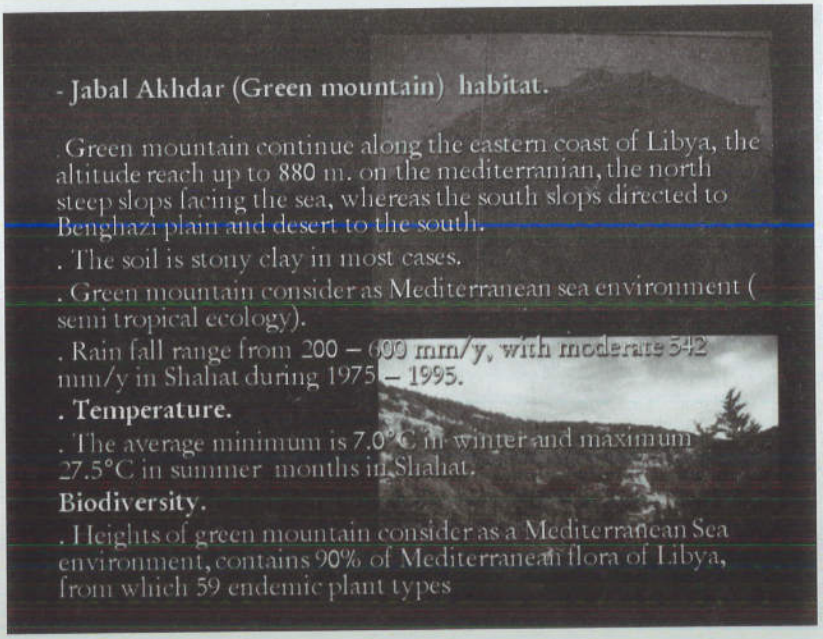
. Bengazi to Dernah 200 – 600 mm/y (highest amount).

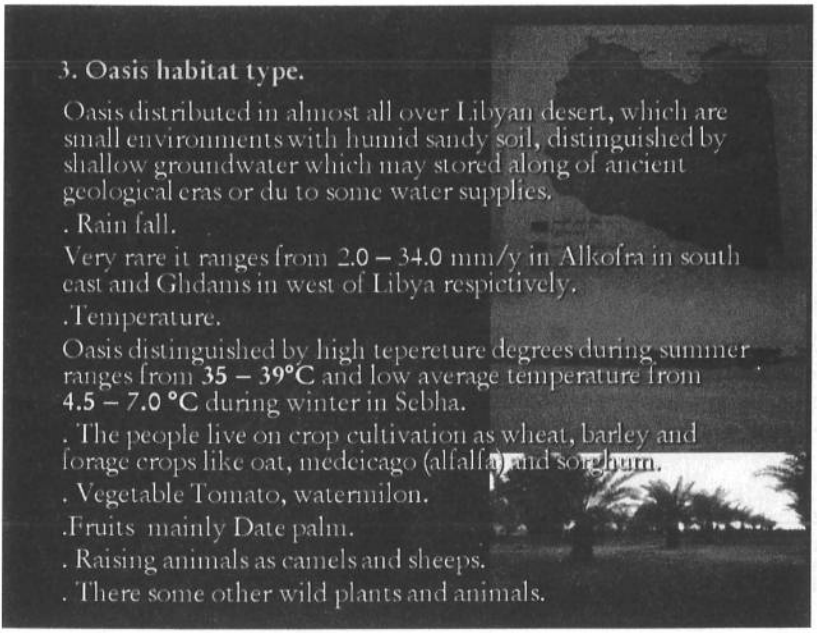
. East of Derna 200 mm/y.

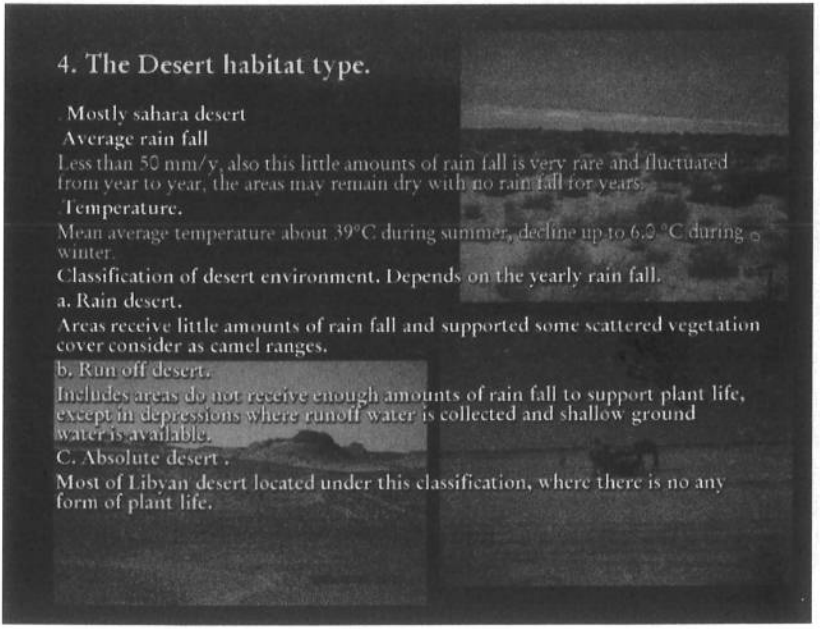

Costal plains.
a. Algafara plain.
Triangle shape of level sandy soil land restricted between the sea cost in the north and the chain of Nufosa mountains continue as long as 300 Km. from Alhoms in the east near the sea to Nalut and Tunisia border in the west 120 Km. to the south, with total area of 20,000 Km..
. Rain fall differ from place to anther and fluctuated between years.
. 285 mm/y in Sidi Alssaid near Tarhuna to 256mm/y in Alzahra near Zawia.
. 135 mm/y in Bir Alganam.
. The plan receives more considerable amounts of water throw runoff from the northern slops of the Nufosa mountains forming some wadis and depressions in the plain.
. Temperature.
Varying from 5.7 – 6.9 °C in Winter, and 31.3 – 33.7 °C in Summer.


2. Mountain environment.•
a. Nuofosa mountain (Jebel Nufosa).
Located in western part of the country from Tunisia border in the west to Alhoms in the east, the highest peaks 900 m. above the sea level whereas most of the mountains ranged from 650 – 760m.
Average rain fall.
From 100 mm/y in the south western par.
300 - 350 mm/y in the middle parts of the mountain near Garyan.
Water run off slops to the north in winter flow throw some valleys accumulates in depressions.
. Tow damps were accomplished in the foot of the mountains 70 Km South east of Tripoli for water storage as:
Wadi Almegenin dam with a capacity of 32 million m³ and Wadi Ghan dam capacity 20 million m³ of water, beside some other obstruct soil dams with small capacity as Wadi Zart near Garian and Bir Ayad near Yefren.


Temperature ranges from 5.o – 6.5 °C in winter and from 32.5 – 34.2 °C.
temperature is more moderate in summer and extreme during winter in the middle of mountains chain near Garian.
Biodiversity:
The flora and fauna in Nufosa mountains and Gefara plain contain:
. 75% of plant types with its fauna.
. This environment contains 26 endemic plant types.
. 65% of fauna types in Libya.


- Jabal Akhdar (Green mountain) habitat.
. Green mountain continue along the eastern coast of Libya, the altitude reach up to 880 m. on the mediterranian, the north steep slops facing the sea, whereas the south slops directed to Benghazi plain and desert to the south.
. The soil is stony clay in most cases.
. Green mountain consider as Mediterranean sea environment (semi tropical ecology).
. Rain fall range from 200 – 600 mm/y, with moderate 542 mm/y in Shahat during 1975 – 1995.
. Temperature.
. The average minimum is 7.0°C in winter and maximum 27.5°C in summer months in Shahat.
Biodiversity.
. Heights of green mountain consider as a Mediterranean Sea environment, contains 90% of Mediterranean flora of Libya, from which 59 endemic plant types


3. Oasis habitat type.
Oasis distributed in almost all over Libyan desert, which are small environments with humid sandy soil, distinguished by shallow groundwater which may stored along of ancient geological eras or du to some water supplies.
. Rain fall.
Very rare it ranges from 2.0 – 34.0 mm/y in Alkofra in south east and Ghdams in west of Libya respictively.
.Temperature.
Oasis distinguished by high tepereture degrees during summer ranges from 35 – 39°C and low average temperature from 4.5 – 7.0 °C during winter in Sebha.
. The people live on crop cultivation as wheat, barley and forage crops like oat, medcicago (alfalfa) and sorghum.
. Vegetable Tomato, watermilon.
.Fruits mainly Date palm.
. Raising animals as camels and sheeps.
. There some other wild plants and animals.


4. The Desert habitat type.
Mostly sahara desert
Average rain fall
Less than 50 mm/y, also this little amounts of rain fall is very rare and fluctuated from year to year, the areas may remain dry with no rain fall for years.
Temperature.
Mean average temperature about 39°C during summer, decline up to 6.0 °C during winter.
Classification of desert environment. Depends on the yearly rain fall.
a. Rain desert.
Areas receive little amounts of rain fall and supported some scattered vegetation cover consider as camel ranges.
b. Run off desert.
Includes areas do not receive enough amounts of rain fall to support plant life, except in depressions where runoff water is collected and shallow ground water is available.
C. Absolute desert .
Most of Libyan desert located under this classification, where there is no any form of plant life.

Biodiversity.

The vailability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems of which they part, this iclude diversity within species, between species and of the ecosystem.

Components.

Ecosystem diversity:

Varaity and frequency of different ecosystems.

Species diversity:

The frequency and diversity of diferrent species.

Genetic diversity.

Frequency and diversity of different genes and/or genome within the species.

Variation.

Both within a population and between populations.

There shuld be utilization on balance between conserving natural BD and providing our human needs.

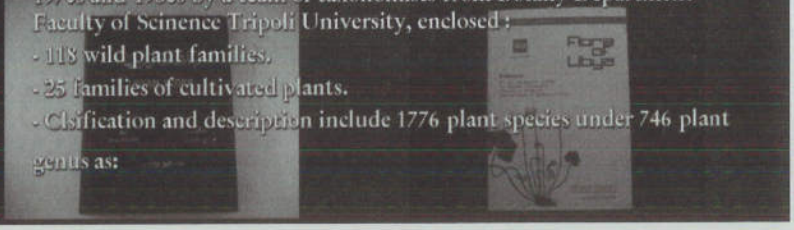
Biodiversity.

a. The attention by biodiversity in Libya started since 1773 – 1776 when Mr. Ghoran Rothman collected some samples of Libyan flora followed by some other researchers and travellers whom interested in biodiversity in Libya and North Africa.

b. H. G. Keith published the Libyan Flora book in two volumes in 1965, enclosed a list of Libyan flora indexed on the plant genus, scientific and vernacular names attached with simple explains of plant families and species.

C. Flora of Libya encyclopaedia in several volumes published during 1970s and 1980s by a team of taxonomists from Botany Department Faculty of Scinence Tripoli University, enclosed :

- 118 wild plant families.
- 25 families of cultivated plants.
- Clsification and description include 1776 plant species under 746 plant genus as:



Family	Genus	Species
Asteraceae	97	239
Poaceae	92	235
Fabaceae	42	211

- 5% of plants considered endimic to Libyan environment, 7% of these plants found in the Green Mountain.
- 50 species reported as rare or endangered plants as Saffron crucus
Crucus sativus **L.**, and ***Globularia alybpum*** **L.**

Biodiversity of the arid of the steppe lands.

Steppe lands north of the desert.
-rain fall 100 – 400mm/ year.
- include perenial grass, succulents, shrubs, other woody plants.
- Contracted vegitation can be in areas of below 100 mm/y. in depressions and wadi.
- Steppe land species and % of endemism.
- endemic steppe species 56.
- endemism of steppic spp.2.1%

Physiogenimic Features of vegetation in steppeland vegetation less than 400 mm/y :
grasses, shrubs, Trees, and halophytas:

- *Stipa tenacissima* (Halpha) a perennyal grass, all the Nufosa mountain.
- Early 20th century, most North africa steppes were dominated by this grass 9 Millions of ha.).

Now declined by more than 2/3 it covers less than 2 - 3 million ha. Du to clearing for farming, overexploitation, burning, and over graizing.

- The *Lygeum spartum* (Halpha mahbola)

Covers considerable area of gypsic soil.

- Other Stipa and stipagrostis species covere large areas. In a diversity of habitats.

- Shrubs and trees.

Many dwarf shrubs dominate large areas of the arid zones including:

- Artimisia herbalba (Shih) and Salsola sp. In the areas less than 150 mm/y in loos sandy-silty shallow soil.
- Other small shrubs include:

Gymnocarrpos decander (Gajroud),
Sacropeterium spinosum (Shubrog),
Thymelaea hirsuta (Mathnan).

These dwarf shrubs coved large areas in arid and semi-arid zones.

Other taller shrubs and trees of the arid and sem-arid lands include:

- Shrub Genera.

Periploca (Hallap).

Atriplex (Gattaf).

Retama (Ratam).

Cligonum (Gandul).

Rhus (Gedarii).

Nitraria (Elurdg).

Tamarix (Elathel).

Ziziphus (Seder).

- Trees.

Acacia, *A. tortill*, *Pistachia atlantica* , *Ceratonia siliqua*.

Other trees covers large area in Jabal alakhdar as: underlined of these genera are endangered

- *Pinus halepensis.*
- *Pistacia lentiscus.*
- *Olea europaea.*
- Cupressus.
- Juniperus.
- Oxycedrus
- *Juniperus phoenicea.*
- Querqus.

Halophytes:

- Saline habitats some areas in steppe zone with some halophytes including:

Bassia arabica, Zygophyllum album, Atriplex spp., Salicornia spp., Suaeda spp., Salsola spp.

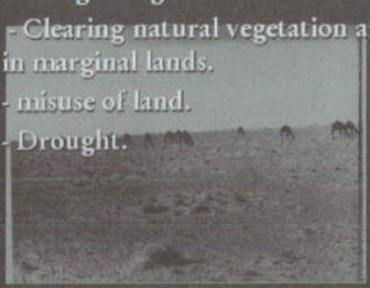
Vegetation of habitat more than 400 mm/y.
Made up of Mediterranean climate vegetation including:

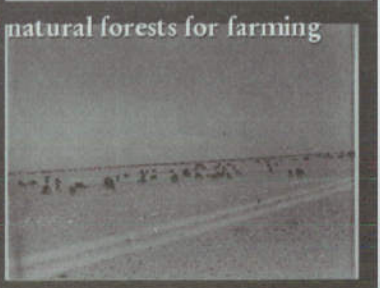
- Juniperus sp. Pinus halipenses, Quercus ilex, Q. coccifera. , Calliprinos cyrenaica, Rosmarinus, Thymus, Genista. Retama.

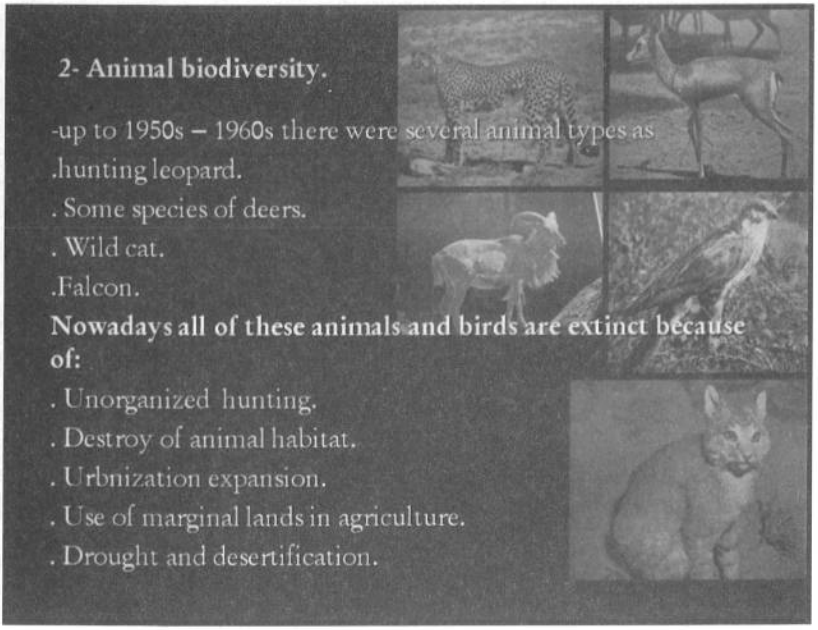
Most of the steep vegetation has resulted from retrogressive successional process from dry open forest including: Pinus spp., Juniperus spp.,

The retrogressive driven by forces including:

- destructive of trees and wood cutting.
- Wild fires.
- over grazing.
- Clearing natural vegetation and natural forests for farming in marginal lands.
- misuse of land.
- Drought.






2- Animal biodiversity.
-up to 1950s – 1960s there were several animal types as
.hunting leopard.
. Some species of deers.
. Wild cat.
.Falcon.
Nowadays all of these animals and birds are extinct because of:
. Unorganized hunting.
. Destroy of animal habitat.
. Urbnization expansion.
. Use of marginal lands in agriculture.
. Drought and desertification.

Type	Number of types
Mammals	58
Reptiles	22
Amphibians	2
Birds	320
Insects	thousands

Many of these animal types consider endangered and needs urgent steps to save their life.

Environmental conservation:

.- Some laws and legislations were issued and plans were curried out to regulate and organize human activities such as hunting, farming, grazing, wood cutting and urbanization expansion in order to conserve vegetation cover and to safe environmental habitat and wild life.

- Established of several preserved areas and national parks, for the purpose of protect plant, animal and wild life, also work on environmental development e.g., seeding, reforestation and bringing in the convenient wild plants and animals to their natural habitat.

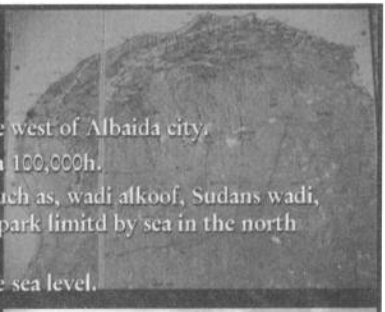
- Increase people awareness and encourage them to participate in the efforts for environmental protection.

National parks and preserved areas:

Even though some national parks and preserved areas were established and their protection and development started science 1970s, 1980s but, all these national parks don't get its lawful and legality only through the lows number 631 and 991 that issued in 1991, 1993.

- From these national parks and preserved areas that get its legitimate by law are:

1- Wadi Alkuf national park.



-In the Green Mountain 17 Km. to the west of Albaida city.

- The park established in 1978, the area 100,000h.

-Includs several valleys in the region such as, wadi alkoof, Sudans wadi, Bait Saleh, and Gergrama wadi.S- the park limitd by sea in the north with a long of 16 Km.

- With maximum heights 850m. Above sea level.

-Climate:

- Mediterranian climate cool rainy in winter while, hot and dry in summer.

-Temperature.

- Ranges from 23 – 26°C in August, and from 8 – 13°C in January.

- Humidity.

- 45% in summer June.

- 78% in September.

- Rain fall.

-Rain fall differ according to the elevations and distance from the sea.-

- **385 mm/y** at the cost.
- **627 mm/y** in the heights.
- **275 mm/y** south margins of the park.
- Soil.
- shallow dark red soil contain some percentages of clay in at the coast with a depth from **0 – 1.5 m.**

-In moderate slops the soil is dark red contain 30% of clay with a depth from **0 – 90 Cm.**

- in the mountain areas the soil is dark contain up to 50% of clay with a depth from **0 – 30** Cm.

Vegetation cover:

- Green mountain is the most reach in vegetation cover from diversity and abundance point of view.
- Wadi Alkoof national park contains good ecological biodiversity to represent most of Green Mountain vegetation cover.
- contans different ecosystems such as, sea shores, coastal plans, hills, streams, and steep mountains. This diversity supports life of many other organisms.
- there are up to 300 types of wild plants include trees, shrubs, and annual plants.

The most important plants in Wadi Alkoof national park:

Plant species	Local name	Plant species	Local name
Retama raetam	رتم		Trees
Prasium najus	عنب الذئب، الشليك	*Arbutus pavarii*	الشملري
Phlomis floccosa	زهيرة	*Juniperus phoenicea*	العرعار
	Herbs, Grasses	*Cupressus sempervirens*	السرو
Helichrysum stoechas	عشبة الارنب	*Ceratonia siliqua*	الخروب
Brassica nigra	خردل اسود	*Periploca angustifolia*	الحلاب
Reseda lutae	خزام ابيض	*Quercus occifera*	البلوط
Scripus maritimus	سعد	*Rhus tripartita*	الجداري
Avena sterilis	الخافور	*Olea europea*	زيتون بري
Sanguisorba minor	شروينة	*Pistacia lentiscus*	البطوم
Rhagadiolus stellatus	نجم الذئب		
Plantago lanceolata	لقيس، انيم		Shrubs
Tragopogon porriffoliu		*Thymus capitatus*	زعتر
Melica minuta stoecheas	نجيلة	*Globularia alypum*	زريقة

2. The degree of wild animal diversity reach its height related to other biomes, because of ecosystems diversity in Green Mountain in general and particularly in Wadi Alkoof national park.

Types	Number
mammalians	300
Emigrant and local birds	26
Reptiles	20
Amphibians	2
Insects and spiders	130

3- Birds in Wadi Alkoof.

Mammalians	الثدييات	Birds	1- الطيور
Hyaena hyaena	الضبع	*Alectoris barbara*	الحجل ابري
Vulpes vulpes	ثعلب احمر	*Falco peregrinus*	الشاهين
Lepus capensis	ارنب بري	*Egretta alba*	بلشون ابيض ك
Hystrix cristata	صيد الليل	*Circaelus gallicus*	عقاب
Spalax ehrinbergi	ابو عماية	*Phoenicopterus ruber*	البشروش الوردي
Amphibians	البرمائيات	*Egretta garzetta*	بلشون ابيض ص
Caretta caretta	السلحفاة ضخمة الراس	*Aguila gallicus*	ملك العقبان
Eryx jaculus	الزواحف الافاعي (الكوبراء)	*Neophorn percnopterus*	الرخمة

2- Abugilan national park.

- Location in the foot of Nofosa mountain chain near Garian city 70 **Km.** south west of Tripoli.
- area.
- 4500 h.

Environment

- Mountain area reach up to 200 – 500 m. above the sea level, with steep slops up to 50%.

Rain fall

Ranged from **200 – 350mm/y**, the lower parts and depressions receive reasonable amounts of rain water du to runoff through valleys and water streams, may reach up to **3.5 million m^3** of water yearly, there are some of springheads such as Abugilan spring, Algafara spring produce abut **$2m^3/h$.**

- Many water reservoirs in the area were built for water storage with a capacity reach to **20,000m^3**

- **Temperature.**
- 5.4 – 17.8°C in January the most cool month.
- 19.5 – 31.0 C in August the most hot and dry month.
- Ecological diversity.

As the park locate between Algefara plan in the north and Nofosa Mountain from the south it can be distinguish into number of ecosystems.

A. valleys environment

.In the main and secondary valles and water streams, that receive good amounts of rain water to support vary plants and wild life.

- This environment support **22** plant types the most important are.

Ziziphus lotus (Seddr)
Lycium europeum (Aousis)
Retama raetam (Ratam)

2-Slops environment.

Represents most area of the park, with difference in the slops degree which is increase in the south and decrease as we go to the north. The most important plants in the park slops are.

Stipa tenacissima (Halpha)
Gymnocarpos decander (Gajroud)
Helianthemum kahiricum (Lerga)

3- Plans and depressions environment.

- Includes the ends of valleys and water streams and depressions where the rain fall water accumulates, soil is settled contain relatively high humidity. Good vegetation cover is available better than the plants in the slops, beside the plants grow in the slops there are other types of plants as.

Helianthemum kahiricum (Zafzaf) -
Gymnocarpos decander (Gajrud)
Stipa capensis

- and there are many other plants some of which has good scientific or economic values as a medical plants, and many other annual plants.

From the ecological studies which curried out during in 1988 some plant types were reported in the area such as:

The plant diversity includes:

No. of types	197
Families	47
Genera	147
Astracea	34
Poacea	24
Fabacea	15
Plants have medical uses	18

-The park was planted with some local and imported forest trees such as.

Pinus halepensis	Karup
Acacia spp.	Sant
Eucaliptus sp.	Elkafur
Pistacia atlantica	Batum
Ceratonia siliqua	Karup

3- Alnagaza national park.

- The park is found in Alnagaza 100 Km east of Triploi.
- Area 1200 ha.
- Environment.
- Chain of hills at the sea cost, there is a dense of vegetation cover support plenty of wild life.

Wild plants in Alnagaza national park.

Sientifc name	Local name	Scientific name	Local name
Gymnocarpus decander	قجرود	*Juniperus oxcidrus*	العرعار
Cistus parviflora	طريش	*Cupressus sp.*	السرو
Periploca aguastifolia	حلاب	*Rosmarinus sp*	الكليل
Nicotiana gluca	عكوز موسى	*Calicotom vilosa*	القنذول -
Lygeum spartum	حلفاء محبولة	*Thymus capitatus*	الزعتر
Anthemis secundiarum	إربيان	*Lycium europeum*	العوسج
Echichilon fruticosum	شنجارة الابل	*Ziziphus lotus*	السدر
		Stipa tenacissima	الحلفاء

Animal diversity in the park.
Good environment and vegetation cover supoort many types of wild animals and birds as.

Scientific name	Local name	Scientific name	Local name
Chamaelleo chamaeleo	الحرباء	Mammalians	الثدييات
Birds	الطيور	*Lepus capensis*	الأرنب البري
Phalocrocorax carbo	غراب الماء	*Vulpus vulpus*	الثعلب الاحمر
Falco tinnunculus	العوسق	*Canis aureus*	ابن اوى
Ardea purpurea	مالك الحزين	*Histrix cristata*	صيد الليل
Accipter nisus	باشق	*Erinaceus algirus*	القنفذ الجزائري
Alectoris barbara	حجل بربري	Bathes	الخفافيش
Burbinus oedicemus	الكروان	Reptiles	الزواحف
		Malpon monospessulanus	الثعبان ابو الفيران

4- Sorman national park.

- location.

In Sorman 65Km. To the west of Tripoli, 4 Km. south of the sea.

- Soil.

Moving sand duns fixed by planting a variety of forest trees and shrubs.

- teperature.
- high in summer,moderate in winter.
- Rain fall in average 210mm/y. fluctuated from year to anther.

Most important forest trees and wild plants in the park.

Launea residifolia	عضيضة	*Eucalyptus spp.*	الكافور، الكينا
Matiola oxyceras	شقارة	*Pinus halepensis*	الصنوبر الحلبي
Horedeum murinum	شعير بري	*Acacia cyanophylla*	السنط الحقيقي
Diplotaxis harra	حارة	*Calycotom Villosa*	القندول
Emex spinosus	حنزاب	*Stipa tortilis*	بهمة
Erodium hirtum	تميرة	*Avena wiestii*	شوفان بري

Sorman national park.

Sorman national park becomes a good forest ecology established on a stabelise soil, it can be used for recreation and entertainment and developed for save of wild life and biodiversity conservation, it's a convenient place for many local, sea birds, emigrant birds and wild animal as well.

Plegadis faicinellus	معزة الماء		التسميات
Ardeola ralloides	واق ابيض صغير	*Poecilictis libyca*	الظربان(الشفشة)
Galerida cristata	قنبرة تتوجة	*Erinaceus algirus*	القنفد الجزائري
Chlidonian niger	وشق اسود	*Vulpes vulpes*	التعلب الاحمر
Strepapelia senegalensis	قمري النخيل		الطيور
Turdoides fulvus	المير (ثرثارة)	*Ciconia ciconia*	لقلق ابيض

5- Algarabuly national park.

- 60 Km. east of Tripoli.
- Area 12,000 h. of plain of land along the coast, in a form of strip.
- Environment.

The sand dunes represent most of the park soil it increase in the height from the sea level up to the elevation of 50 m. Forest trees as Acacia and Eucalyptus were planted in the park since 1965, 1975.

- Climate.

Semi Mediterranean sea climate, characterized by low temperature accompanied with rain fall in winter, whereas temperature is relatively high in summer. Because of park location near the sea, temperature degrease are moderate in summer and winter.

Temperature range from 21 – 36°C and 6 – 18 °C in winter.

- Average rain fall 300mm/y.

- **Vegetation cover.**

Eucalyptus trees represents the plant cover in the southern part of the bark, while **Acacia** in the north part also there are other planted trees as ***Acacia tortilis*** and ***Pinus halpensis*** and some other natural plants as shrubs and herbs.

- The trees provide a good habitat for wild life where animal and birds, that find a convenient environment to stay all or part of the year such as.

- **10 types of mammalians belongs to 5 orders were reported in the park.**

Lepus capensis	- الأرنب البري
Vulpes vulpes	- الثعلب الاحمر
Canis aureus	- ابن اوى
Geneta geneta	- حيوان الرثم
Erinaceus algirus	- القنفذ الجزائري

Birds consider the most important group where there are 200 types of birds arranged as.

- 15% Resident birds live in the bark.
- 40% vested birds during winter.
- 45% emigrant birds cross the region through their travel from north to the south of the Sahara.

Alectoris barbara	الحجل البربري	*Falco tinnunculus*	العوسق
Hiamantopus hiamantopus	أبومغازل	*Nycticorax nycotirax*	غراب الليل
Fulica atra	الغر	*Ardeola ralloides*	واق ابيض
Sterna bengalensis	خرشنة متوجة	*Ardea cinerea*	بلشون رمادي
Gallinula choropus	دجاجة الماء	*Platalea leucordia*	أبوملعقة
Phlalacrocorax carba	غراب الماء	*Ardea purpurea*	مالك الحزين

Bir Ayad protected Area.

- The protected area is called Bir Ayad range project, the purpose of the project is to develop the area as an agriculture and range developed by exploitation the rain fall water which reserved in a number of soil dams, with a capacity of **1,440,000 m3** of water.
- Locate at Nufosa foot mountain 130 Km. south west of Tripoli
- Elevation of the area **150 – 200** m. above sea level.
- Climate.

very dry average temperature **5.3 °C** in January, **39.0 °C** in July.

- Humidity

. **40%** during summer, **64%** during winter months.

- Rain fall is fluctuated from year to year and even between the rainy months in the year.

It was registered **350 mm** during 1965/1967, while the rain fall was only **31 mm** during 1997/1980 season.

Soil.

- Coarse sand to sandy loam soil.

Vegetation.

The project planted with different forest trees as, Eucalyptus and Acacia sp. (*Acacia tortillis*) which is grow naturally in the region. Beside some other trees and shrubs as:

Retama raetam	الرتم
Acacia tortillis	الطلح
Rhus tripartita	الجداري
Periploca aguistifolia	الحلاب
Ziziphus lotus	السدر
Calicotom villosa	القندول
Lycium europeum	العوسج

Animal diversity.
The reports denote there were many animals in the region that extinct now.

Animals reported in the area

Vulpus vulpus	الثعلب الاحمر
Hyaena hyaena	الضبع المخطط
Canis aureus	ابن أوى
Lepus capensis	الارنب البري
Erinaceus algirus	القنفذ الجزائري
Histrix cristata	صيدالليل (الشيهم)
Gerbillus spp.	العضل

7- Alhisha protected zone.

- The protected zone locate in Alhisha zone 300 Km. east of tripoli, 100 Km west of Sirt, 30 Km. along the sea coast. The protected area restricted by Alhisha from the south, Tawrga from north and the sea coast from the east.

- Area 160,000h

- - Rain fall ranged from 50 – 150 mm/y.

- The Area was studied by the **Arabic Organization for Agriculture Development** in 1992 where divided into some ecological categories ,

A. Valleys ecology.

Includes main and secondary water streams which support up to 100 types of wild plants as:

Lycium sp.	العوسج
Acacia tortilis	الطلح
Ziziphus lotus	السدر
Periploca angustifolia	الحلاب
Rhus tripartitus	الجداري
Atriplix sp.	القطف
Limoniastrum onopetalum	الزيتا

2- Depresion ecology. Contain deep soil accumulated by rain fall water, it supports wild vegetation cover as:

Retama raetam	الرتم
Artimisia herbaalba	الشيح
Gymnicarpus dec.	القجرود

3- plains ecology.

The soil contain high levels of gypsum, where there are some plants like.

Traganum nudatum	الضمران
Hamada scoparia	الرمت
Anabasis aphylla	العجرم
Salsola tetragona	الجل

4- Sea shore sand duns ecology.

In most cases moving sand duns, where there are some types of plants.

Retrania retusa
Tamarix aphylla
Retama raetam

5- Salt marsh ecology.

Some area with high levels of salts, where there are some halophyte plants.

- *Salsola vermiculata*
- *Atriplex halimus*
- *Halocnemum strobilcenum*
- *Limonastum monopetalum*

Arrangements were taken to establish number of new protected zones.

Site	Nature of the site	Average rain fall mm/year	Area in hectare
Girian	Dry ecology	100 -200	5000
Nalut	Dry mountain ecology	50 -100	500
El haraba	Dry ecology	50 - 100	500
Subrata	Pinus forest ecology	300 - 400	500
Msalata	Mountain forest	200 -350	1800
Zeliten	Salt marsh ecology	150 - 250	1000

Dangers and threats facing biodiversity and the natural environment.

Human consider the main factor that effect on the environment and biodiversity , if we excluded the main climatic factors like drought.

The main factors that adverse effect on the environment and biodiversity:

1- sever grazing.

2- Farming and cultivation in marginal lands.

3- hunting.

4- Urbnization expansion.

5- wood cutting.

Numbers of animals and the range capacity.

Grazing zone	Ranges area in hectare	Ranges capacity	Num. of animals	Excess Numb.	Surplus %
Western	4,773,000	766,000	2,232,000	1,466,000	191%
Middle	3,187,000	258,000	1,494,000	1,236,000	479%
Eastren	5,284,000	810,000	2,040,000	1,230,000	152%
Total	13,244,000	1,834,000	5,766,000	3,932,000	212%

Recomandation for conservation.

With all the threats and pressures, the unique biodiversity of Arid and Semi-Arid lands is facing to day, a lot of effective and prolonged national and regional conservation efforts have to be need.

It has to save very variable biological resources and their habitat to support live for many generations to come.

A- main objectives of such conservation include efforts measures

- To conserve species/genetic diversity ; to maintain and protect the valuable natural ecosystems.

- To play and manage sustainable use of resources; to follow for cropping, limited grazing, idustrial activities, Oil exploitation and production, tourism.

- To raise public awareness and have all stakeholders take part in planning.

- To allow for educational and scientific research activities.

- To develop effective ways of monitoring of status and trends of BD in arid and desert ecosystems.

- To put the required legislations and frame work to require from firms wishing to exploit any of the resources to execute to have an environmental authorization before starting their activities.

B - Member states of ISESCO need to conserve much of their biodiversity together; they should:

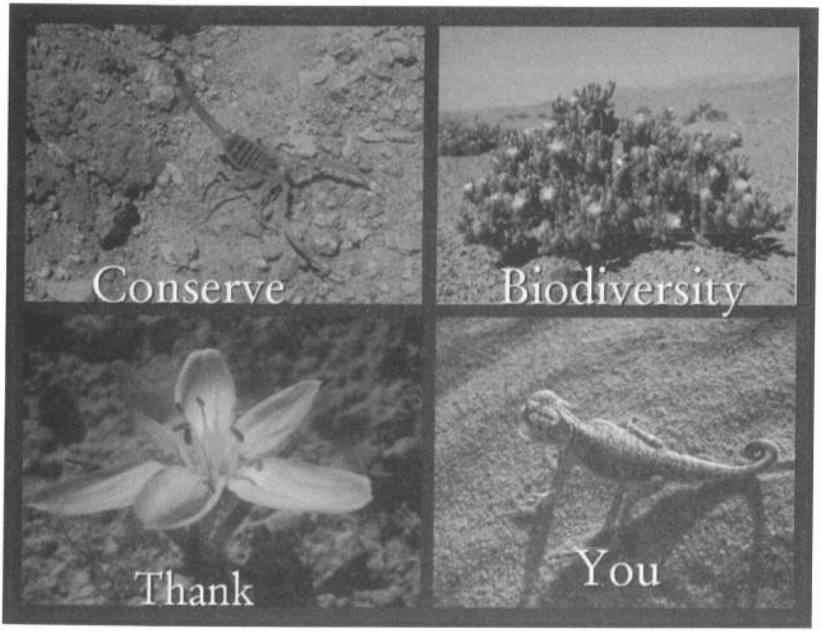
1- coordinate their B. D. conservation efforts in legislation development, national strategies and action programs.

2- Execute shared conservation projects including establishment of nature reserves along common borders of sensitive B. D. habitats.

3 - Promote regional cooperation in science and technology relevant, to conservation biotechnology, ecological studies and applications.

4- Promote regional network for biodiversity assesment, monitoring and cnservation.

5- Consider shared programs in environmental education, capacity building, conservation awareness among the people of the membe states.



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