



## Convention on Biological Diversity

# FOURTH NATIONAL REPORT ON IMPLEMENTATION OF THE CONVENTION

# ON BIOLOGICAL DIVERSITY

# JORDAN

**Ministry of the Environment**

**Amman**

**March 2009**

***(Quercus aegilops* the emblem tree of Jordan)**

**Jordanian Ministry of the Environment**

# **Forth National Report** ON IMPLEMENTATION OF THE CONVENTION **ON BIOLOGICAL DIVERSITY**

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# JORDAN

## FOURTH NATIONAL REPORT

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## Abbreviations

**ASEZA**: Aqaba Special Economic Zone Authorities.
**CBD**: Convention on Biological Diversity
**CNM**: Contingent Valuation Method.
**COP**: Countries of Parties
**CPC**: Cleaner Production Center.
**DOS**: Department Of Static.
**EIA**: Environmental Impact Assessment.
**FAO**: Food and Agriculture Organization.
**GCEP**: General Corporation for Environment Protection
**GEF**: Global Environmental Facility
**GIS:** Geographic Information System.
**GNP**: Gross National Product.
**GOJ**: Governmental Of Jordan.
**GRU**: Genetic Resources Unit.
**GTZ**: German Technical Cooperation.
**ICARDA**: International Center for Agriculture Research in Dry Areas.
**IUCN:** International Union for the Conservation of Nature
**JBD**: Jordan Biodiversity Data Base.
**JES**: Jordan Environment Society
**JSDCBD**: Jordanian Society for Desertification Control and Badia Development.
**JUST**: Jordanian University Of Science And Technology.
**JVA**: Jordan Valley Authority.
**LMO**: Living Modified Organisms.
**MOA**: Ministry Of Agriculture.
**MOE:** Ministry Of Environment.
**MOPIC:** Ministry of Planning and International Cooperation.
**MOTA**: Ministry Of Tourism Antiquities.
**MWI**: Ministry Of Water and Irrigation.
**NBSAP**: National Biodiversity Strategy and Action Plan.
**NCARE**: National Center for Agriculture Research and Extension
**NCPC**: National Cleaner Production Center.
**NEAP:** National Environment Action Plan
**NES:** National Environment Strategy
**NEWS**: National Environmental and Wildlife Society.
**NGO**: Non- Governmental Organization.
**NRA**: Natural Resources Authority.
**NUB**: National Unit for Biodiversity
**RJSED**: Royal Jordanian Society for Ecological Diving.
**RSCN**: Royal Society for the Conservation of Nature
**RSS**: Royal Scientific Society.
**SAP**: Strategic Action Plan.
**SMES**: Small and Medium Enterprises.
**SSSI**: Sites of Special Scientific Interest.
**UNCED**: United Nations Conference on the Environmental Development
**UNDP**: United Nations Development Programme
**UNEP**: United Nations Environment Programme
**UNESCO**: United Nations for Education, Science and Culture Organization
**USAID:** United State Agency for the International Development
**WB:** World Bank
**WWF**: World Wildlife Fund

# JORDAN

## FOURTH NATIONAL REPORT (CBD)

## EXECUTIVE SUMMARY

### 1. OVERALL STATUS AND TRENDS IN BIODIVERSITY AND MAJOR THREATS:

- The area of Jordan is about 89,000 ($km^2$), of which over 80% are semi-arid and arid areas. Due to its strategic location among three continents; Asia, Africa and Europe, Jordan treasure astonishing biological diversity, including terrestrial, wetland and marine ecosystems. The country has diverse topography, considerable climatic variations, and several habitat types. The climate in Jordan is mostly semi-arid to arid desert with an average precipitation ranging from less than 70 mm in the eastern and southern desert areas arising to 350 mm in the middle, and up to 600 mm per annum in the north-west part of the country. The topography of the country is mostly desert plateau with highland and Jordan Valley in the west. The lowest point in Jordan (and on earth) is 416 meters below sea level at the Dead Sea. The highest point is 1,854 meters above sea level at Jabal Um Dami Mount (Rum Area).

- **Environmental (biological) and cultural resources** are highly diverse, however, Jordan has few natural resources, but water; oil and gas are extremely scarce. For several years now, renewable groundwater resources have been extracted at an unsustainable rate in order to meet the increasing demand. Consequently, surface and groundwater quality in some areas is deteriorating. Only 4% of land is arable and less than 1% is forest and woodland.

- **Wild plants** constitute a very important component of Jordan's biological diversity. Conservation of this natural heritage is listed high on the priorities of the government. The total number of plant species recorded in Jordan exceeds 2500 species of which 100 are endemic. The endemic species include *Iris petrana, Cousinia dayi, Plantago maris-mortui, Crucianella transjordanica, Centaurea procurrens, Scrophularia nabataerum, Tamarix tetragyn,* and *T. palaestina. A* preliminary survey by the Royal Society for the Conservation of Nature (RSCN) in the Mujib Nature Reserve identified the presence of rare species, including *Adiantum capillus-veneris, Sternbergia clusiana, Pistacia atlantica, Caralluma aaronis, Pergularia tomentosa, Equisetum ramosissimum, Crocus moabiticus, Micromeria sinaica* (endemic; also on IUCN list), *Teucrium leucocladum, Ajuga chamaepytis, A. iva, Lavandula pubescens,* and *Withania somnifera* (new to the area). Endemic species in the Mujib Nature Reserve include *Withania obtusifolia, Micromeria sinaica,* and *Crocus moabiticus.* Rare or very rare species of the country are 375 (including species of the genus *Orchis, Romulea, Biarum* and *Globularia*), 150 are endangered (including species of the genus *Juniperus* and *Cupressus*) and currently about 75 species are considered

extinct. These species represent 152 families and about 700 genera. A few studies related to the identification of endemic, rare and endangered flora have been carried out in Jordan. Flowering plants constitute the most dominant group of species and are particularly visible in the spring. Several species have ornamental or medicinal value.

- The importance of these **Medicinal Plants** as a source of preventive and/or curative health value (for both people and livestock) have been recognized by local people since time immemorial. A total of 485 species of medicinal plants, which belong to 330 genera and 99 families, are reported from Jordan (Oran and Al-Eisawi, 1994). Those identified medicinal plants are herbs, shrubs and trees.
- **Plant flagship** species would include *Iris petrana*, Jordan's floral emblem, *Iris negranesis*, *Moringa peregrina, Salvadora persicum, Cyclamen persicum, Aloe vera, Pinus halepensis, Juniperus phoenicia, Acacia arabica, Pistacia palestina* and others.
- According to **IUCN Red List** of 2006, out of 1,562,663 described species in the world, a total of 40,168 species have been evaluated. Out of these species evaluated, 16,118 were found to be threatened. There is a clear need for more research on most of the species that exist in order to know their status. There are only very taxonomic groups that have been comprehensively evaluated and these are birds, amphibians, mammals and only two groups of plants, namely conifers and cycads.
- According to the IUCN Red List of 2006, Jordan has 47 globally **threatened species**. Of the 78 species and sub-species of **mammals** in Jordan, comprising 24 genera and 7 orders, 12 species are considered as globally threatened. These include the Arabian Oryx *Oryx leucoryx*, and Nubian Ibex *Capra ibex nubiana*. The story of the Arabian Oryx is very well-known where the species has become extinct on the national level due to excessive hunting. The same was going to happen with the Nubian Ibex, but it was brought back from the brink through enforcement and captive breeding programs in Shoumari, Mujib and Dana nature reserves. Other globally threatened mammal species that are recorded in Jordan include all three gazelle species that exist in Jordan, although one of them, *Gazella gazelle,* is lately thought to be nationally extinct. These species are Dorcas Gazelle *Gazella dorcas*, Mountain Gazelle *Gazella gazella* and Goitered Gazelle *Gazella subgutturosa.* Many wild species in Jordan are considered globally threatened and a total of 49 different species and subspecies are listed in the IUCN 2000 Red Data List.

- 425 species of **birds**, which are predominantly migratory in Jordan, 15 species are globally threatened. The most well-known bird in Jordan and the region is Houbara Bustard *Chlamydotis undulate*, this species is categorized as vulnerable and it is still facing a continuous threat from hunting in Jordan and other neighbouring countries. Another globally threatened species that has been

declining rapidly in our region and is recorded in Jordan is Saker Falcon *Falco cherrug*, which has been caught for falconry especially for hunting Houbara Bustards. Other bird species include Syrian *Serinus syriacus* (VU) which has its largest breeding colony in the world, in Dana Nature Reserve.

- Jordan has 97 species of **reptiles**, 5 species of **amphibian** pertaining to 4 groups: Bufonidae, Hylidae, Ronidae and Pelobatidae, and 20 species of freshwater fish.
- **The Gulf of Aqaba** is a host to more than 450 species of fish, 150 species of hard coral, 120 species of soft coral in addition to sponges, snails, crabs and sea turtles. 20% of mollusks and echinodermata as well as several species of algae occurring in the Gulf may be endemic. Of between 300-350 species of fish, which have been recorded in Aqaba, 7 are recognized as endemic.

- During the last 120 years, many **native Jordanian species** have been lost and became nationally **extinct**, including some species that were once widespread and common. Some species are now considered to be on the verge of national extinction. This is the result of many threats including destruction of natural habitats and ecosystems, introduction of invasive species, modernization of transportation and improved hunting techniques. About **9** macro-mammals and at least **5** plants are extinct from the wild (Jordan Country Study On Biological Diversity, 1998). Further studies are likely to reveal more extinct organisms, especially invertebrates and plants.
- The decline in Jordan's wildlife is mainly affecting large mammal populations as well as other taxonomic groups. About 46 mammal, 11 bird, 4 reptile, 6 freshwater fish, 2 marine invertebrate and 4 marine vertebrate species are nationally **threatened** in Jordan. **Plant diversity in Jordan is facing a dramatic** decline **as a result of habitat loss and degradation. Such destruction has led to the isolation of many species, which, in turn has led to a loss of their genetic diversity, and to a high risk of extinction. Currently, between 200 and 250 plant species are nationally rare and 100 to 150 species are nationally threatened.**
- **Habitat degradation** and species loss in the Rift Valley is serious and accelerating, largely as a result of increasing development pressure, inappropriate agricultural practices and population growth. Among the many rare and endangered animals and plants recorded in the Valley to date are the sand cat, leopard, Nubian ibex, Syrian wolf, griffon vulture, imperial eagle, lesser kestrel, Dead Sea sparrow, *Epipactis veratifolia, Maerua crassifolia* and several endemic fish, birds and insects. A dramatic drop in the number of migrating birds along the corridor has also been noted, and especially of large raptors, storks and cranes (Birdlife International).
- The main threats to species at risk are the loss and degradation of habitats, **over-exploitation** of plant and animal species, extensive agricultural and unplanned developmental activities, pollution, invasion of introduced species, overgrazing, water extraction, illegal hunting and trading of species and intensive use of agrochemicals.

- However the **trend** in biological diversity in certain areas is declining due to several stress factors, higher attention is being given day after day by all involved national parties; thereto say; the trend in conserving biodiversity is thriving.

## 2. KEY ACTIONS TAKEN IN SUPPORT OF THE CONVENTION'S THREE OBJECTIVES AND TO ACHIEVE THE 2010 TARGET AND GOALS AND OBJECTIVES OF THE STRATEGIC PLAN OF THE CONVENTION:

- JORDAN ratified the Convention on Biological Diversity in 1993. This is the widest nature conservation convention and covers all classic nature conservation issues as well as related environmental protection, protection of genetic resources and ecosystems. Fulfillment of this convention in fact covers all activities of a state in protection of life and livable environment. The three main goals of the convention are 1) protection of biodiversity, 2) sustainable use of its components and, 3) fair and equitable sharing of the benefits arising out of the utilization of genetic resources.
- **The National Biodiversity Strategy and Action Plan** constitutes a major contribution to the country's development plan. This strategy was released in the year 2003. the strategy envisage that land, water, pasture, terrestrial and marine ecosystems as well as wildlife and aquatic resources in particular are central to agriculture, fisheries and tourism development. Also, it envisages habitat protection, natural resource conservation and sustainable use options offer significant opportunities for demonstrating that conservation of biodiversity represents a vital investment in future sustainability of Jordan's economic and social development.

- Jordan has good professional experts in nature conservation and biodiversity, well established nature conservation science producing the basic knowledge useful for practical nature conservation. Application of this knowledge is sometimes a separate question. Endangered resources have been accounted in (National Strategy and Action Plan on conservation of biodiversity 2003); they are partly studied, monitored and restored in certain cases. The situation with the sustainable use of the components of biodiversity is more complicated. Nature conservation outside the conservation areas is not functioning in suitable way; actual use of resources is not subject to the principles of sustainability of biodiversity. Environmental awareness and nature education of the society, including the Parliament, Government, and state officials have been increased. The fundamental role of biodiversity protection as the basis for all human activities is growing among students, farmers, women and rural communities.
- Jordan has given high priority to **conservation and sustainable use** of biodiversity components, in view of its position in a region of uncertain political condition, the climatic conditions, and the country's rapid development and urbanization that have led to habitat fragmentation and ecosystem degradation.

This situation is also manifested in financial constraints, which have impeded adequate progress in implementing the Convention on Biological Diversity. As a result, the programs of work for implementing different articles of the Convention on Biological Diversity have not yet been sufficiently integrated into national policy and to the developmental action plans, and national financial allocations for implementation have been inadequate.

- The IUCN/WWF mission which started in 1974, aimed to promote Wildlife conservation in the country, and with the help of The Royal Society for the Conservation of Nature, their research and survey came up with a result to suggest to have 4% of Jordan's total area as Protected Areas that represent Jordan's geological, ecological and hydro biological characteristics.
- In 1977, IUCN-WWF defined 12 different areas of conservation importance, which encompasses the majority of Jordan's biological diversity. These 12 areas make up the network of Jordan's **protected areas**. In 1998, RSCN has carried a review of the protected areas network and has further proposed six more protected areas. So, the total number of areas that should become part of the protected areas network is eighteen. Up to date, seven protected areas (reserves) have been established.

- In relation to the first goal of CBD what is happening in Jordan is very progressive, the protected areas reached to 5.64% of the terrestrial land and marine. Protection is greatly needed to maintain the country's rich biodiversity, in the face of development pressures acting upon a fragile arid environment. Conserving biodiversity and sustainable use of biological resources are fundamental to achieving sustainable development as they are an echo to the teachings and beliefs of Islam on the obligation for man to maintain balanced relations with the other elements of creation.
- Special attention was directed to other **zones outside protected areas**. These zones have significant conservation importance due to their great diversity of species and habitats. They consist of important bird areas, important wetland areas, marginal areas at national borders (protected by the army) and wildlife corridors. In 1995, Bird life International in cooperation with RSCN defined and globally declared 27 areas in Jordan as important bird areas covering a total area of 7600 $km^2$ about 8.5 % of the total area of Jordan. Seven of these sites are already protected areas and the other ten are proposed, on the other hand 13 important wetland areas were identified to help protection of nationally and internationally important water birds and other threatened birds.

- In 1980, Jordan was among the original 30 countries to declare support for the **World Conservation Strategy**. Another milestone in this effort is the National Environment Strategy (NES), a resource book of information and guidelines for

action, compiled by a team of 180 Jordanian specialists with the support of the World Conservation Union (IUCN) and the United States Agency for International Development (USAID). In October 1995, the first Jordanian Environmental Law was passed to achieve the principle objectives mentioned in NES, and the National Environmental Action Plan (NEAP) was prepared emphasizing the need for a national biodiversity inventory. In September 1996, the national Agenda-21 project was launched to lay the ground for sustainable resource development and environmentally sound management in the country and adopted in the year 2000. The country study on biodiversity in Jordan was completed in 1998 by the National Unit for Biodiversity (NUB) under the guidance of the GCEP, with the financial support from the Global Environment Facility (GEF) through the United Nation Environment Program (UNEP). In 2003, the "Temporary Jordanian Environmental Protection Law" was adopted and in 2003, and the "Ministry of Environment" was created in the same year.

- At the regional and international levels, the Government of Jordan has **ratified** the following conventions: the Convention on Biological Diversity (UNCBD) in 1993, the Convention to Combat Desertification (UNCCD) in 1996, the Ramsar Convention in 1977, the Cartagena Protocol in the 2000, the Convention of Migratory Species (CMS) in the year 2000, the Convention on Persistent Organic Pollutants (POPs) in 2002, the World Heritage Convention and the Regional Convention for the Conservation of the Red Sea and the Gulf of Aden Environment. The Framework Convention on Climate Change (UNFCCC) was ratified in 1993 and Kyoto Protocol was ratified in 2003. Jordan is also party to IUCN and UNESCO Man and Biosphere Program through a national committee. In (2006), the Government of Jordan released the National Agenda document that describes conservation of biodiversity.

- The country has to take steps in the field of raising **public awareness**, formulating policies and strategies, enforce legislations, improve national, regional and international cooperation, and finally documenting the national biodiversity work both in research and nationally-organized meetings.

- Several **research programs** and baseline **surveys** have been conducted inside protected areas and to lesser extent outside them. These research activities were mainly promoted by the RSCN to meet its principle objective, which is conserving representative sites, and its wild species through shaping and improving management plans for these sites. Other research activities have taken place by Ministry of Agriculture, academic institutions and voluntary work. One of the major studies that is carried out outside protected is the National Water bird Census, which the RSCN has been implementing, in

coordination with Wetlands International, in all major wetlands and water bodies of the country since 2000.

- **Jordanian universities** and academic institutions play a major role in nature conservation. This is mainly achieved through carrying out ecological research. Other than that, some universities such as Jordan University, Yarmouk University and Hashemite University have Herbaria that work as ex-situ conservation centers for plants of all the different habitats in the country. Several professors from all different universities work through their universities on supervising a lot of the ecological research that is being carried out in the country. Also, tissue culture technique can be considered in some cases as a conservation tool that is used in some university laboratories in order to propagate some plant species.

- While the importance of *in-situ* conservation cannot be overemphasized, *ex-situ* conservation in zoos, aquaria, botanic gardens and germ plasm banks may contribute to species-at-risk conservation by maintaining viable populations of species threatened in the wild, providing educational and public awareness services, and serving as sites for basic and applied research.

- **Captive breeding programs** were established by the Royal Society for the Conservation of Nature to breed and reintroduce some of the nationally extinct animals including Arabian Oryx (*Oryx leucoryx*), Roe Deer (*Capreolus capreolus*), Blue-necked Ostrich (*Struthio camelus molybdophanes*) - the closest subspecies to the globally extinct Syrian Ostrich (*Struthio camelus syricus*) -, Asiatic Wild Ass (*Equus hemionus onager*) - the closest subspecies to the globally extinct Syrian Wild Ass (*Equus hemionus hemippus*).

- **The Forestry Seed Center** was established in 1992 within the Department of Afforestation and Forests with assistance provided by the German Technical Cooperation (GTZ). The main objective of this center is to secure high quality forest seeds through: selection, collection, processing, certification and handling these seeds.
- Jordan established **a Genetic Resources Unit** (GRU) in 1993 at the National Center for Agricultural Research and Technology Transfer (NCARTT)/Ministry of Agriculture through a project supported by the United States Agency for International Development (USAID).

- **The conventions and legislation** for environmental protection are playing a major role in protecting species at risk. 18 acts and 8 regulations were issued in Jordan, including provisions for the protection of the environment. Most of these acts are being implemented through different government agencies.

**3. AREAS WHERE NATIONAL IMPLEMENTATION HAS BEEN MOST EFFECTIVE OR MOST LACKING:**

- In general not all biodiversity fields inclusive analysis about fulfilling high-priority action, focused on concrete results in Jordan. Different sectoral overviews and analysis have been prepared, such as conservation areas, progress reports of based on monitoring different actions. When tackling general nature conservation and sustainable use measures, then in the meaning of convention's article 6 the obligations have been fulfilled to extent possible, as well as in situ nature conservation according to article 8, except for paragraph h (preventing introduction of alien species).
- As to lacking, the current biodiversity policy within different strategies is varied, some strategies are concentrate on protection of endangered species and planned actions, others are rather focused on dealing with consequences in their fields, while several strategies either take the biodiversity in consideration or not at all. There is no approach to the system as a whole, where the final target should be to decrease the loss of species. It can also be said that in-situ and ex-situ nature conservation according to convention's article 9 has found low sufficient attention in strategies and action plans.
- In different national strategies the sustainable use of biodiversity components according to article 10 has been tackled to extent possible, but it should be complemented in fields such as inclusion of local communities and private sector into restoring nature etc. Despite the fact that sustainable nature use as a term is integrated into majority of main laws and strategic documents, the implementation of the principle in practice is another question. Especially in industrial, urbanization, transport, and energetic fields the conflict with sustainable nature use is inevitable. In conservation areas and in connection with protected species the protection of biodiversity and sustainable use, sustainable use is more or less effective in practical life. Unfortunately, these principles are not effective outside protection areas and in the cases of species that are not under protection.
- As to the monitoring-related actions included in the convention, the monitoring of alien invasive species that is needed in both water and terrestrial environments is low dealt with. The alien species indicators are also insufficiently used.
- The central conception of the biodiversity process – ecosystem approach – is taken into account in some measure in the most important strategies like in documents of The National Biodiversity Strategy and Action Plan, but rather in its narrower meaning, by sub-components of the ecosystems. The protection of components may not give the desired effect in ensuring the protection of the whole ecosystem.
- Climate change and biodiversity – Jordan has ratified the UNFCCC in 1994 and the MoE became the national focal point for climate change issues and UNFCCC. Jordan started its efforts within the framework of the UNFCCC in 1996 with a GEF-UNDP supported programme for national capacity building in documenting national emissions of greenhouse gases and preparing Jordan's national communication to the UNFCCC. But relevant actions are mostly connected to air pollution and do not tackle the effect of climate change to biodiversity. Jordan made further progress on climate change. A second national communication, a

greenhouse gas inventory and a national adaptation policy are being prepared. Altogether six Clean Development Mechanism (CDM) projects have been prepared, but not yet registered at the UN level.

- With the current national action plans the topic access to genetic resources according to chapter 15 is partly covered as well as the resulting fair and equitable sharing of the benefits, but this sphere is merely represented with the program of genetic resources of forest and agricultural plant resources. Strategically the genetic resource development directions outside agricultural use have been remained undefined on the national level. Therefore the area is largely not legislatively regulated, nor covered with process indicators.
- As in environmental strategies, the convention's third pilar – fair and equitable sharing of the benefits of genetic resources – is also insufficiently tackled in several strategies. The usage of biotechnology and share of its benefits according to article 10 is weakly represented in strategies actions.
- The information exchange according to article 17 is low sufficiently covered in strategies, especially information exchange with other countries, in particular with developing countries, including access to and transfer of technology according to article 16, the topic of intellectual property; and patenting of nature.

- Jordan has been ranked 70th among 149 countries in the 2008 **Environment Performance Index (EPI),** a position described by the Ministry of Environment as "notable progress" that needs to be built on in the future. The Kingdom was given an overall score of 76.5 per cent in the study, which ranks 149 countries on 25 indicators tracked across six established policy categories: Environmental health, air pollution, water resources, biodiversity and habitat, productive natural resources and climate change. In 2006, Jordan ranked 64 among 133 countries, advancing 20 positions compared to a similar study conducted in 2005. Jordan was ranked 7th in 2008, compared to 6th place in 2006, when the pioneering 2006 EPI was carried out. The index was conducted by Yale and Colombia universities in cooperation with the World Economic Forum in Geneva and the Joint Research Centre of the European Commission in Italy.
- The recently established **Environmental Police Department** and a unit in the Ministry of Environment set up to enforce environmental laws and regulations. Jordan has also started using unleaded fuel during 2008 to reduce air pollution. Moreover, the ministry has intensified inspection campaigns on industrial facilities to check on their abidance by environmental regulations and has also introduced new techniques to treat medical and solid waste.

- Jordan participates in the **Euro-Mediterranean Horizon 2020 Initiative** on environmental measures in the Mediterranean area, including the identification of key environment infrastructure issues in the fields of municipal waste, urban waste water and industrial pollution as well as appropriate financing sources and mechanisms. Jordan has ratified relevant international and regional conventions and protocols. The European Commission and Jordan have

enhanced cooperation and information exchange, including on environmental governance and water.

- Jordan finalized a **review report** of its previous national environment strategies, and the Ministry of Environment adopted a strategic plan for 2007-2010.

- Overall, framework **legislation** and sectoral legislation are in place in most areas, but continue to require further development, in particular with regard to implementing legislation. Latest legislation includes a by-law on land use. New legislation on an environmental fund, as well as on monitoring and inspections is under preparation. This is also the case for municipal waste management policies as well as a master plan related to conservation policies within land use.

- The **Ministry of Environment** has now gone through a comprehensive reform, within which its administrative capacities have been significantly strengthened. Consequently, the Ministry can be considered as representing best practice in Jordan for strengthening public administration.

- Jordan has taken comprehensive steps in **conservation of natural resources and biodiversity**. Promote the application of strategic environmental assessments, such as waste management, air pollution, integrated permitting, climate change and environment aspects of trade have been identified for possible closer cooperation.
- Jordan has a network of 7 operating **protected areas** and another 5 suggested. The protected areas in Jordan are managed by a national NGO: The Royal Society for the Conservation of Nature (RSCN) according to an agreement with the Ministry of Environment, making it a unique experience in decentralizing protected areas management in the Arab world.
- As Biodiversity conservation is being shared by many public and civil organizations in Jordan, **a national biodiversity committee** was established within the process of developing the NBSAP and it functions as an advisory group on biodiversity issues for the MoEnv.
- Throughout Jordan, many examples have been developed in implementing **local community- based conservation projects** that link between biodiversity conservation and meeting local livelihood demands. Some of the main successes and case studies of excellence in this aspect were developed by the GEF Small Grants Programme (SGP).
- Jordan has implemented many **biodiversity conservation projects** in the past decade, mainly based on GEF support. Some of the most notable previous biodiversity conservation projects are:
  - Conservation of the Dana and Azraq Protected Areas
  - Biodiversity Country Studies - Phase I
  - Biodiversity Strategy and Action Plan (BSAP) and Report to the CBD
  - Conservation and Sustainable Use of Dry land Agro-Biodiversity of the Near East.
- Currently, an impressive set of biodiversity conservation projects is being implemented that contains the following:

- Conservation of soaring migratory birds in the eastern sector of the Africa-Eurasia flyway system (Rift Valley and Red Sea flyways)
- Conservation and Sustainable Use of Biodiversity in Dibeen Nature Reserve
- Conservation of Medicinal and Herbal Plants
- Integrated Ecosystem Management in the Jordan Rift Valley

❒ Jordan hosts the regional World Conservation Union **(IUCN) Office** for West, Central Asia and North Africa (WESCANA) and has a 13-member strong IUCN national committee based on public and civil society organization. Jordan is also the host of the Middle East branch of BirdLife International. This organizational system provides a conducive environment for biodiversity conservation if effective coordination mechanisms are developed and operated.

## 4. MAJOR OBSTACLES ENCOUNTERED IN IMPLEMENTATION:

The CBD stocktaking report identified the following national capacity constraints for implementing the CBD listed according to priorities as classified by stakeholders. These constraints include:

1. Low integration of the CBD concepts in the national policy formulation process:
2. Weak linkages between research and policy making:
3. Lack of national directives for Biodiversity Impact Assessment:
4. Lack of clear policies for regional and international technology transfer:
5. Incomplete national guidelines and management plans for conservation sites:
6. Lack of an institutional process for assessing the impact of regional and international agreements on biodiversity:
7. Low national capacity of community management for in-situ conservation outside the protected areas:
8. Lack of economic incentives and valuation of biodiversity components:
9. Weak mobilization of financial resources available for biodiversity:
10. Lack of long-term coordination mechanism between institutions working in biodiversity:
11. Weak institutional and legislative framework for regulating access to genetic resources and benefits sharing:
12. Lack of a national knowledge management and data processing system for monitoring and reporting on biodiversity:
13. Lack of long term programs for awareness and education on new concepts in biodiversity management.
14. Another important obstacle is financial and directly related to the fact that the protection and sustainable use of biological diversity is not a priority for the government. In spite of the fact that state budget financing for nature conservation is annually increasing, this is still insufficient to fulfill all obligations under the CBD.

## 5. FUTURE PRIORITIES:

- In Jordan, the institution responsible for implementing the biodiversity convention is the Ministry of Environment and other ministries have referred to the requirements of this convention in their work quite rarely. The fields regulated by this convention comprise different environmental topics and the implementation of their targets need integrated approach (agriculture, environment, transport, tourism, regional development, fishing etc.). The solution is certainly better planning of financial resources and making co-operation between different institutions more effective in order to avoid duplicating actions. In order to use financial resources effectively it is important to take previously stated targets as base and always perform target prioritizing.
- It is important to integrate the strategies and development plans for different sectors in order to avoid overlapping actions or, focusing on different actions. The most important targets and actions in the convention's interest should be covered in state importance development documents (i.e. Environmental Strategy and Action Plan, Nature Conservation Development Plan, Transport Development Plan, Energy Development Plan etc.), but at the same time the coherence and unity of the targets and the planned actions should be assured. In conclusion, the best solution is better co-operation and co-ordinate actions that take into account both the needs and possibilities of governmental institutions and the society as a whole.
- In fulfilling the demands of biodiversity the classical conflict between nature conservation and economy needs to be overcome – the nature conservation limitations restrict building activities, creating mines etc. The only way to overcome this is increasing awareness (both of the general public and, officials and politicians), open discussion, good co-operation between different institutions and seeking for alternative solutions.

# CHAPTER I
# OVERVIEW OF BIODIVERSITY STATUS, TRENDS AND THREATS

**INTRODUCTION:**

JORDAN ratified the Convention on Biological Diversity in 1993. This is the widest nature conservation convention and covers all classic nature conservation issues as well as related environmental protection, protection of genetic resources and ecosystems. Fulfillment of this convention in fact covers all activities of a state in protection of life and livable environment. The three main goals of the convention are 1) protection of biodiversity, 2) sustainable use of its components and, 3) fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

In Jordan, we have good professional experts in nature conservation and biodiversity, well established nature conservation science producing the basic knowledge useful for practical nature conservation. Application of this knowledge is sometimes a separate question. Endangered resources have been accounted in (National Strategy and Action Plan on conservation of biodiversity 2003); they are partly studied, monitored and restored in certain cases. The situation with the sustainable use of the components of biodiversity is more complicated. Nature conservation outside the conservation areas is not functioning in suitable way; actual use of resources is not subject to the principles of sustainability of biodiversity. Environmental awareness and nature education of the society, including the Parliament, Government, and state officials have been increased. The fundamental role of biodiversity protection as the basis for all human activities is growing among students, farmers, women and rural communities.

Jordan has given high priority to conservation and sustainable use of biodiversity components, in view of its position in a region of uncertain political condition, the climatic conditions, and the country's rapid development and urbanization that have led to habitat fragmentation and ecosystem degradation. This situation is also manifested in financial constraints, which have impeded adequate progress in implementing the Convention on Biological Diversity. As a result, the programs of work for implementing different articles of the Convention on Biological Diversity have not yet been sufficiently integrated into national policy and to the developmental action plans, and national financial allocations for implementation have been inadequate.

In relation to the first goal of CBD what is happening in Jordan is very progressive, the protected areas reached to 3.8% of the terrestrial land (including wildlife reserves, rangeland reserves and forest areas). Protection is greatly needed to maintain the country's rich biodiversity, in the face of development pressures acting upon a fragile arid environment. Conserving biodiversity and sustainable use of biological resources are fundamental to achieving sustainable development as they are an echo to the teachings and beliefs of Islam on the obligation for man to maintain balanced relations with the other elements of creation.

In 1922, the first conservation efforts started with an afforestation project where a network of 23 forests and rangeland have been declared and established, after which several projects were implemented and the number of rangeland reserves increased to reach nowadays 34 reserves of area 115000 ha represent 1.3% of the country's total area.

In 1966 The Royal Society for the Conservation of Nature was established, it was mandated by the government to set up a network of Protected Areas(establish & manage), to conserve Jordan's Wildlife. The government alongside RSCN started a national program due to Late king Hussein's' request to conserve nature by establishing Protected Areas, and the first National Park was Azraq which was established in 1968.

**Biological Diversity status:**

Convention on Biological Diversity (CBD) was ratified by Jordan in 1993. Joining to the Convention not only opens access to international help for the purpose of supporting the activities on conservation of biodiversity, but also imposes certain liabilities on the country. Along with realization of Strategy and Action Plan on conservation of biodiversity in kingdom developed in 2003, one of the liabilities of The Hashemite Kingdom of Jordan - is the preparation of national reports.

"Third National Report on Biological Diversity in Jordan" were prepared and presented to Convention Secretariat on Biodiversity in 31 JULY,2006.

The Government of Jordan has also ratified the following conventions: the Convention to Combat Desertification (UN CCD) in 1996, the Ramsar Convention in 1977, the Cartagena Protocol in the 2000, , the Convention of Migratory Species (CMS) in the year 2000, the Convention on Persistent Organic Pollutants (POPs) in 2002, the World Heritage Convention and the Regional Convention for the Conservation of the Red Sea and the Gulf of Aden Environment. The Framework Convention on Climate Change (UNFCCC) was ratified in 1993 and Kyoto Protocol was ratified in 2003. Jordan is also party to IUCN and UNESCO Man and Biosphere Program through a national committee. In (2006), the Government of Jordan released the National Agenda document, this document describes to the national policy and targets relevant to the conservation of biodiversity.

Fourth national report constitute by itself important information source for survey work on biodiversity and making of significant decisions in frames of implementation of Convention on biodiversity by Jordan. Data cited in the report allow governmental institutions and community to mobilize their efforts and improve their activities on conservation and sustainable utilization of biodiversity for achieving of stable social-economic development of the country.

- The area of Jordan is about 89,322 square kilometers ($km^2$), of which over 80% are semi-arid and arid areas. Due to its strategic location between three continents; Asia, Africa and Europe, Jordan treasure astonishing biological

diversity, including terrestrial, wetland and marine ecosystems. The country has diverse topography, considerable climatic variations, and several habitat types.

- The climate in Jordan is mostly semi-arid to arid desert with an average precipitation ranging from less than 70 mm in the eastern and southern desert areas arising to 350 mm in the middle, and up to 600 mm per annum in the north-west part of the country.

- The topography of the country is mostly desert plateau in the west and highland in the east, the eastern highlands descends easterly to the Jordan Valley. The lowest point in Jordan (and on earth) is 416 meters below sea level at the Dead Sea. The highest point is 1,854 meters above sea level at Jabal Um Dami Mount (Rum Area).

- Much of the country's diversity is due to the formation of the Great Rift Valley. The titanic forces that created the Rift Valley produced the high western mountains. The altitude ranges from around 400m below sea level by the shores of the Dead Sea up to 1854m at the edge of the Southern Heights. Apart from the rift valley, Jordan is mainly desert composed of either basalt or Hammada; a striking ecologically-rich ecosystem that is unique to Jordan and Syria. Furthermore, Jordan has some highly specialized habitats, the most noteworthy being the Dead Sea, in which surrounding communities are considered to be of global importance.
- Environmental (biological) and cultural resources are highly diverse, however, Jordan has few natural resources, but does export phosphates, potash and shale oil. Natural resources especially water; oil and gas are extremely scarce. Only four percent of land is arable and about 1 percent is forest and woodland. Jordan's water resources consist first and foremost of surface and groundwater, and for several years now, renewable groundwater resources have been extracted at an unsustainable rate in order to meet the increasing demand. Consequently, surface and groundwater quality in some areas is deteriorating. Current water demands in many areas particularly in Amman have not been met satisfactorily and the costs of developing new water resources are rising rapidly.

- Jordan's **flora** is rich and highly diverse. Around 2,500 species of vascular plants have been recorded, belonging to 152 families, and about 700 genera, representing about 1% of the total flora of the world. One hundred species are endemic, (including species of the genus *Crocus, Colchicum, Iris* and *Verbascum*), 375 are rare or very rare (including species of the genus *Orchis, Romulea, Biarum* and *Globularia*), forming about 2.5% of the total flora of Jordan, which is considered high in world standards. Currently about 75 species are considered extinct. Many species are considered rare or threatened, but the status of many plants remains unknown, especially concerning the globally threatened ones. 349 plant species recorded in Jordan are considered to be rare, 76 threatened species, in addition to 18 species listed on the IUCN lists. Flowering plants

constitute the most dominant group of species and are particularly visible in the spring. Several species have ornamental or medicinal value.

- ❒ Jordan is divided into four different bio-geographical zones; the Mediterranean, Irano-Turanian, Saharo-Arabian and Sudanian penetration. Within these diverse zones, there are 13 different vegetation types each representing different elements of flora and fauna (Al- Eisawi, D. 1996).

1. **Aleppo Pine Vegetation Type** This vegetation type is characterized by the dominance of Aleppo Pine trees (*Pinus halepensis*) in the form of forests. It appears in high altitudes, beginning with 700 m a.s.l. Ex. Jerash, Dibbin, Ajloun, and Zai/Salt.
2. **Ever green Oak Forests** This vegetation type is characterized by the dominance of Evergreen oak trees(*Quercus calliprinis*) growing in altitudes more than 700 m a.s.l. this vegetation type represents most of Jordan's forests. This vegetation type is represented in Wadi Sir/Amman, Irbid, Tafila, Salt, Ajlun, Zerqa, and the area between Shaubak and Petra.
3. **Deciduous Oak Forest** This vegetation type is characterized by the deciduous oak trees(*Quercus aegilops*); it grows in altitudes lower than the rest of Jordan's forests. Most of the forests are not conserved; it ranges from Um Qais/Irbid in the north, Yarmouk River, Ajloun and near King Talal Dam
4. **Juniper Forests (***Juniperus phoenicia***):** This type of vegetation is only represented in the southern heights and on altitudes exceeding 1000 m a.s.l, in areas that witness's snowfall on yearly basis like Rashadiyya, Dana in Tafila, Shaubak and Wadi Musa. This type is characterized by Juniper trees that can grow along with Cypress and Pistachio.
5. **Tropical Vegetation Type** This vegetation type resembles the Sudanian vegetation, it is dominant near the Dead Sea, most of the areas representing this vegetation has been turned into farms except in Ghor Fifa.
6. **Acacia Vegetation** Spreading in mountainous and rocky areas in Wadi Araba, Aqaba, Wadi Yutum and Wadi Rum, the Acacia trees grows and becomes denser towards the bases of mountains.
7. **Mediterranean non-forest Vegetation** This vegetation type lacks trees; it is composed of shrubs, following degradation of a forest.
8. **Water Vegetation** This vegetation is found around springs and water courses and in wadis. Examples: Yarmouk River, Zarqa River, Wadi Shu'aib, Wadi Mujib and Wadi Al Hasa.
9. **Steppe Vegetation** This type is restricted to the Irano-turanian zone with few penetrations in the Saharo-arabian and Mediterranean zones. This type is characterized by bushes and shrubs, Mujib is a good example.
10. **Hammad Vegetation** This vegetation type forms most of the Saharo-Arabian zone; it is characterized by vegetation that can tolerate the salinity and hot weather. The Eastern Desert is the best example.
11. **Sand Dune Vegetation** This type is well represented in Wadi Araba and Wadi Rum, this vegetation type is characterized by shrubs that are able to fix sand dunes that might reach to 3 m high.

12. **Saline Vegetation** This vegetation type is characterized by saline- tolerant plant species; this vegetation type is dominant in the Saharo - Arabian zone around Azraq oasis, in Ghor area and the Dead Sea shore.
13. **Mud Flat Vegetation** This type is best represented in the Saharo-arabian zone, especially where water is found along with mud and granite soils. When the water dries the soils become very hard, making it very difficult for plants to grow. Azraq Qa and Al Jafer are the best examples on this type.

- Plant **flagship** species would include *Iris petrana*, Jordan's floral emblem, *Iris negranesis*, *Moringa peregrina, Salvadora persicum, Cyclamen persicum, Aloe vera, Pinus halepensis, Juniperus phoenicia, Acacia seyal, Quercus aegilops* Jordan's tree emblem, *Pistacia palestina* and others.
- The flora of Jordan is rich in **medicinal and aromatic** plants, as well as herbs and spices, mainly the Umbelliferae, Labiatae and Compositae. Many of these grow in sub-serial or successional communities in various states of ecological development or degradation, and are adapted to and or semi-arid conditions. M/H plants in Jordan are distributed all over the country from the eastern desert to the western highlands and from the semi-arid north to the extremely arid south. The importance of these
- Plants as a source of preventive and/or curative health value (for both people and livestock) have been recognized by local people since time immemorial. A few studies related to the identification of endemic, rare and endangered flora have been carried out in Jordan. An estimated 100 species of endemic plants comprising about 2.5 percent of the total flora have been identified. A total of 485 species of medicinal plants, which belong to 330 genera and 99 families, are reported from Jordan (Oran and Al-Eisawi, 1994). Those identified medicinal plants are herbs, shrubs and trees. The endemic species include *Iris petrana, Cousinia dayi, Plantago maris-mortui, Crucianella transjordanica, Centaurea procurrens, Scrophularia nabataerum, Tamarix tetragyn,* and *T. palaestina. A prelinmnary* survey by the Royal Society for the Conservation of Nature (RSCN) in the Mujib Nature Reserve identified the presence of rare species, including *Adiantum capillus-veneris, Sternbergia clusiana, Pistacia atlantica, Caralluma aaronis, Pergularia tomentosa, Equisetum ramosissimum, Crocus moabiticus, Micromeria sinaica* (endermc; also on IUCN list), *Teucrium leucocladum, Ajuga chamaepytis, A. iva, Lavandula pubescens,* and *Withania somnifera* (new to the area). Endemic species in the Mujib Nature Reserve include *Withania obtusifolia, Micromeria sinaica,* and *Crocus moabiticus.*
- The key characteristics of Jordan's **fauna** relict their diverse origins: the Oriental, Afrotropical and Palaearctic and the original Palaeremic, or Desertic. The location which Jordan occupies between Asia, Europe and Africa has favored the extension of some animal species from these regions. Also, the presence of four

different biotopes in a restricted area such as Jordan is of great significance, as it provides a wide range of diverse habitats.

- Throughout history, Jordan has been known for its forests and plants and was described by many historians and travelers as green and rich in wildlife. Old mosaics and stone inscriptions in Jawa and Wadi Qatif show pictures of oryx, *Capra ibex* and oxen. They also show primitive ways of hunting in antiquity. The mosaics in Madaba show the richness of wildlife during the Byzantine era: pictures represent various species like the wild pig, the leopard, Asian lions and birds. The Umayyad desert castles depict the richness of wildlife in the Umayyad period. The visitor to Amra castle can see fresco paintings which show dramatic hunting scenes depicting *Equus hemionus*. There are also paintings of deer, wild rabbits and other species. In the Halabat castle one can see the mosaics which show *Acinonyx hubatus*, wolves, wild rabbits and deer. All these are proof of the rich wildlife in those times.
- According to **IUCN Red List** of 2006, out of 1,562,663 described species in the world, a total of 40,168 species have been evaluated. Out of these species evaluated, 16,118 were found to be threatened. There is a clear need for more research on most of the species that exist in order to know their status. There are only very taxonomic groups that have been comprehensively evaluated and these are birds, amphibians, mammals and only two groups of plants, namely conifers and cycads.
- Many wild species in Jordan are considered globally threatened. According to the IUCN Red List of 2006, Jordan has 47 globally **threatened** species. Of the 78 mammals in Jordan, 12 are considered as globally threatened. A total of 49 different species and subspecies are listed in the IUCN 2000 Red Data List. The proportion of threatened species to the total number of species is very high, especially in mammals, where 24 out of 77 mammals (31.16%) are considered globally threatened. In birds, 15 out of 425 total species (3.1%) are considered globally threatened.

- These include the Arabian Oryx *Oryx leucoryx*, and Nubian Ibex *Capra ibex nubiana*. The main threat that is facing these two species is hunting. The story of the Arabian Oryx is very well-known where the species has become extinct on the national level due to excessive hunting. The same was going to happen with the Nubian Ibex, but it was brought back from the brink through enforcement and captive breeding programs in Mujib and Dana nature reserves. Other globally threatened mammal species that are recorded in Jordan include all three gazelle species that exist in Jordan, although one of them, *Gazella gazelle,* is lately thought to be nationally extinct. These species are Dorcas Gazelle *Gazella dorcas*, Mountain Gazelle *Gazella gazella* and Goitered Gazelle *Gazella subgutturosa.*
- So far, 78 species of mammals have been recorded in Jordan (Amr. Z. 2000), belonging to 7 orders, 24 genera and 26 families. These mammals are a major part of the biological pyramids that exist in Jordan. Some of these mammals are carnivores, meat-eaters, such as Striped Hyena, Wolf, Golden Jackal, and the different species of foxes and wildcats. Others are herbivores, plant eaters, such

as the Nubian Ibex, Arabian Oryx, and the different gazelle species. Interestingly, the largest groups of mammals are the rodents and the bats which make up almost two-thirds of the mammals in Jordan.

- The 425 bird species recorded in Jordan belong to 58 families (Ian Andrews, 2000). Of which more than 300 are migrant, 95 are resident with definite breeding records, 111 are winter visitors, 202 are passage migrants, 81 are vagrants, and 63 are different summer visitors. Jordan hosts breeding populations for some globally threatened species including Lesser Kestrel (*Falco naumanni*) and Syrian Serin (*Serinus syriacus*). In addition to these, there are several globally threatened species that are recorded in Jordan at different times of the year. This includes Imperial Eagle, Palled Harried, Lesser Spotted Eagle and Sociable Lapwing. Fifteen bird species are threatened, while 21 are on the CITES appendices. These include one of the most well-known birds in Jordan and the region and that is Houbara Bustard *Chlamydotis undulate*, This species is categorized as vulnerable and it is still facing a continuous threat from hunting in Jordan and other neighbouring countries. Another globally threatened species that has been declining rapidly in our region and is recorded in Jordan is Saker Falcon *Falco cherrug*, which has been caught for falconry especially for hunting Houbara Bustards. Other bird species include Syrian *Serinus syriacus* (VU) which has its largest breeding colony in the world, in Dana Nature Reserve.
- Jordan's location by the Great Rift Valley makes the country one of the most important flyways for migratory birds. Hundreds of thousands of birds cross the area yearly, some of which are globally threatened, such as the Corncrake (*Crex crex*).

| Scientific Name | English Name | Global Status |
|---|---|---|
| *Anser erythropus* | Lesser White-fronted Goose | Vulnerable |
| *Aquila clanga* | Greater Spotted Eagle | Vulnerable |
| *Aquila heliaca* | Imperial Eagle | Vulnerable |
| *Chlamydotis undulate* | Houbara Bustard | Vulnerable |
| *Crex crex* | Corncrake | Vulnerable |
| *Falco cherrug* | Saker Falcon | Endangered |
| *Falco naumanni* | Lesser Kestrel | Vulnerable |
| *Geronticus eremita* | Northern Bald Ibis | Critically Endangered |
| *Grus leucogeranus* | Siberian Crane | Critically Endangered |
| *Marmaronetta angustirostris* | Marbled Teal | Vulnerable |
| *Numenius tenuirostris* | Slender-billed Curlew | Critically Endangered |
| *Oqyura leucocephala* | White-headed Duck | Endangered |
| *Pterodroma incerta* | Atlantic Petrel | Vulnerable |
| *Serinus syriacus* | Syrian Serin | Vulnerable |
| *Torgos tracheliotus* | Lappet-faced Vulture | Vulnerable |
| *Vanellus gregarius* | Sociable Lapwing | Critically Endangered |
| *Petrocles alchata* | Pintailed sandgrouse, | Vulnerable |
| *Alectrois chukar* | Chukar partridge, | Vulnerable |
| *Gyps vulvus* | Griffon vulture, | Vulnerable |

| | | |
|---|---|---|
| *Fulica atra* | Coot, | Vulnerable |
| *Ammoperdix heyi* | Sand Partridge, | Vulnerable |
| *Anas platyrhynchos* | Mallard | Vulnerable |
| *Ciconia ciconia* | White stork | Vulnerable |
| *Burhinus oedicnemus* | Stone curlew | Vulnerable |
| *Falco peregrinus* | Peregrine falcon | Vulnerable |
| *Francolinus francolinus* | Black francolin | Vulnerable |

- The Gulf of Aqaba is a host to more than 1,000 species of **fish**, 110 species of hard **coral**, 120 species of soft coral in addition to sponges, snails, crabs and sea turtles. Twenty percent of **mollusks** and echinodermata as well as several species of algae occurring in the Gulf may be endemic. Of between 300-350 species of fish, which have been recorded in Aqaba, 7 are recognized as endemic. There are no natural barriers between Jordan and the surrounding countries, which enables animals to move freely from one country to another. Consequently, endemics are shared between two countries or more. For example, *Agama* (stellio) *Ntellio picea* is endemic to the area between Jordan and Syria; while *Micrelaps muelleri* is in the area of Palestine, Lebanon and Jordan.
- The Jordanian herpetofauna consists of 102 species. They are comprised of five amphibians pertaining to 4 groups: Bufonidae, Hylidae, Ronidae and Pelobatidae, and 97 reptile species. More than half of these reptiles are lizards, nearly 55 species; whereas there are 37 species of snakes, of which only 7 are poisonous. The majority of Jordanian herpetofauna is not critically endangered; however, about 14 species are relatively rare and 2- 4 species might be already extinct (Dr. Modry. 1999), and 20 species of freshwater fish.

Endangered and vulnerable of Jordanian herpetofauna.

| **Scientific Name** | **English Name** | **Conservation Status** |
|---|---|---|
| *Acanthodactylus ahmaddisii* | | Endangered |
| *Chalcides guentheri* | Gunther's Cylindrical Skink | Vulnerable |
| *Lacerta kulzeri* | | Endangered |
| *Telescopus hoogstraali* | | Endangered |
| *Testudo graeca* | Greek Tortoise | Vulnerable |

- **Invertebrates** form a large and diverse group of fauna. Jordan's invertebrates are unique, as their composition is a mixture of several faunal origins. Due to the large numbers of invertebrates that forms more than 70% of the total

number of faunal species in addition to the deficiency of comprehensive research on invertebrates in Jordan, the exact number is unknown.

**(c) Main threats to biodiversity;**

- Despite its rich biodiversity, Jordan's nature is facing many threats as reflected by the national and global status of many species and their habitats. Efforts are needed on the national level in order to help in reviving the populations of threatened species.
- Many of the species appearing in the historical record are now extinct or threatened. The main factor that led to the extinction of wildlife is the deterioration of the vegetation cover in many areas of Jordan due to urbanization. The most destructive period so far witnessed was during the First World War: a railroad was built between Eneiza and Hisha Bida in Shobak, and trees were cut for train fuel. Other factors that led to the deterioration were overgrazing, decrease of rainfall and drying of grazing lands. During the Second World War, repeating rifles and vehicles were introduced to the area, depleting some wildlife animals to the point of extinction. Major threats to the natural environment of different areas still include overgrazing, woodcutting, and hunting.
- In some cases, species left their natural environments and moved to others which were unsuitable. Some of these new areas to which animals fled had weak environmental and biological capacity that could not absorb large additional numbers of the same species. This happened in the case of deer, which fled from the eastern desert to areas with very difficult accessibility. The deer were thus protected from man, but the areas could not provide habitat for large numbers of them.
- The intensive chemical pest-control of locusts and agricultural diseases by insecticides has led to increased pressure on wildlife. During the last 120 years, many native Jordanian species have been lost and became nationally extinct, including some species that were once widespread and common. Some species are now considered to be on the verge of national extinction. This is the result of many threats including destruction of natural habitats and ecosystems, introduction of invasive species, modernization of transportation and improved hunting techniques. About nine macro-mammals and at least five plants are extinct from the wild (Jordan Country Study On Biological Diversity, 1998). Further studies are likely to reveal more extinct organisms, especially invertebrates and plants.

| | **Relict species:** | | **Endangered mammals:** |
|---|---|---|---|
| 1 | Red squirrel, *Sciurns anomalus syriacus* | 1 | Leopard *Panthera pardus* |
| 2 | Common otter, *Lutra lutra seistanica* | 2 | Nubian ibex, *Capra ibex nubiana* |
| 3 | Snake, *Coluber ravergierri* or *Coluber* | 3 | Arabian gazelle, *Gazella gazella* |

| | | | |
|---|---|---|---|
| | *nummifer* | | |
| 4 | Sand dunes, *Psumophile species* | 4 | Wolf, *Canis lupus* |
| | Gekko, *Stenodactylus doriae* | | **Vulnerable mammals**: |
| | Lizards *Sphenops sepsoides* or *Lacerta laevis* | 1 | Dorcas Gazelle (*Gazella dorcas*). |
| | **Endangered reptiles:** | 2 | Dugong (*Dugong dugon*). |
| | Tortoise, *Testudo graeca terrestris* | 3 | Eurasian Otter (*Lutra lutra*). |
| | Dabb, *Uromastyx aegypticus microlepis* | 4 | Geoffroy's Bat (*Myotis emarginatus*). |
| | **Vanished, but re-introduced:** | 5 | Lesser Horseshoe Bat (*Rhinolophus hipposideros*). |
| | Ostrich, *Struthio camelus syriacus* | 6 | Long-fingered Bat (*Myotis capaccinii*). |
| | Onager, *Equus hemionus* | | |
| 5 | Arabian oryx, *Oryx lencoryx* | | |
| 6 | Roe deer, *Capreolus capreolus* | | |

- **Challenges:** Limited financial resources, limited available technical capacities, and limited civil society and local community participation are considered the most important challenges in the implementation of this target. In general, the main challenges in implementation of this target are:

- Political unrest in the region and its complications on Jordan including changes to the population dynamics of the national community, increased demand on natural resources especially water, financial challenges, and many others.

  - Deficiency in relevant laws and regulatory guidelines
  - Low and weak enforcement due to limited financial and technical capacities
  - Ambiguity of responsibility generated by deficiency of regulations
  - Delay in releasing the national biodiversity policy
  - Lack of sufficient information
  - Limited financial resources
  - Limited technical capacities at the institutional level
  - Limited civil local community participation

**NATURE CONSERVATION ACTIVITIES INCLUDE PROTECTION OF THE LOCAL NATURE FROM ALIEN SPECIES:**

- **Conservation activities**

- Jordan has given high priority to conservation and sustainable use of biodiversity components. Protection is greatly needed to maintain the country's rich biodiversity, in the face of development pressures acting upon a fragile arid environment. Conserving biodiversity and sustainable use of biological resources are fundamental to achieving sustainable development.

- Jordan realizes the fragile nature of ecosystems owing to the socio-economic, physio-geographic and climate conditions of the country. In 1922, the first conservation efforts started with an afforestation project where a network of 23 forests and rangeland have been declared and established, after which several projects were implemented and the number of rangeland reserves increased to reach nowadays 34 reserves.
- The IUCN/WWF mission which started in 1974, aimed to promote further Wildlife conservation in the country, and with the help of The Royal Society for the Conservation of Nature, their research and survey came up with a result to suggest to have 4% of Jordan's total area as Protected Areas that represent Jordan's geological, ecological and hydro biological characteristics.
- The Royal Society for the Conservation of Nature have established 7 wildlife reserves of area 130000 ha represent 1.5% of the country's total area. 11 reserves are proposed of 295000 ha represent 3.3% of the country's total area. The forest areas could be added to protected areas, of 85000 ha represents 0.96% of the country's total area. The conservation areas all together cover 330 000 ha of terrestrial land and 1 000 ha of water surface and 7 National and Recreational Parks of 10 000 ha.

- In 1966 The Royal Society for the Conservation of Nature was established, it was mandated by the government to set up a network of Protected Areas(establish & manage), to conserve Jordan's Wildlife. The government alongside RSCN started a national program due to Late king Hussein's' request to conserve nature by establishing Protected Areas, and the first National Park was Azraq which was established in 1968. The IUCN/WWF mission which started in 1974, aimed to promote further Wildlife conservation in the country, and with the help of The Royal Society for the Conservation of Nature, their research and survey came up with a result to suggest to have 4% of Jordan's total area as Protected Areas that represent Jordan's geological, ecological and hydro biological characteristics.

- In 1980, Jordan was among the original 30 countries to declare support for the World Conservation Strategy. Another milestone in this effort is the National Environment Strategy (NES), a resource book of information and guidelines for action, compiled by a team of 180 Jordanian specialists with the support of the World Conservation Union (IUCN) and the United States Agency for International Development (USAID).

- In October 1995, the first Jordanian Environmental Law was passed to achieve the principle objectives mentioned in NES, and the National Environmental Action Plan (NEAP) was prepared emphasizing the need for a national biodiversity inventory. In September 1996, the national Agenda-21 project was launched to lay the ground for sustainable resource development and

environmentally sound management in the country and adopted in the year 2000. The country study on biodiversity in Jordan was completed in 1998 by the National Unit for Biodiversity (NUB) under the guidance of the GCEP, with the financial support from the Global Environment Facility (GEF) through the United Nation Environment Program (UNEP). In 2003, the "Temporary Jordanian Environmental Protection Law" was adopted and in 2003, and the "Ministry of Environment" was created in the same year.

- At the regional and international levels, the Government of Jordan has ratified the following conventions: the Convention on Biological Diversity (UNCBD) in 1993, the Convention to Combat Desertification (UN CCD) in 1996, the Ramsar Convention in 1977, the Cartagena Protocol in the 2000, , the Convention of Migratory Species (CMS) in the year 2000, the Convention on Persistent Organic Pollutants (POPs) in 2002, the World Heritage Convention and the Regional Convention for the Conservation of the Red Sea and the Gulf of Aden Environment. The Framework Convention on Climate Change (UNFCCC) was ratified in 1993 and Kyoto Protocol was ratified in 2003. Jordan is also party to IUCN and UNESCO Man and Biosphere Program through a national committee. In this year (2006), the Government of Jordan released the National Agenda document, this document describes to the national policy and targets relevant to the conservation of biodiversity.

- The global importance of Jordan's biodiversity lies within its geographical location, climate and geology. Its unique geographical features for a tremendous diversity of habitats, including some of the oddest distribution of species, communities and coral. Jordan's territorial water in the Gulf of Aqaba is home to many globally important marine species such as the marine turtle (*Chelonia mydas*), whale shark, 300 species of fish and 250 species of corals, many of which are globally endangered and protected by several international conventions and treaties. The marine Aqaba reserve had been established and managed by RSCN in cooperation with universities, NGO and local governorate.

- In its fresh water sources Jordan maintains two endemic species of fish: Serhani fish (*Aphanius serhani*) and the Dead Sea gara (*Gara ghorenensis*). Jordan's biodiversity is yet to be fully uncovered, in fact many species are being discovered every year, and some are first time recordings in science.

- In 1977, IUCN-WWF defined 12 different areas of conservation importance, which encompasses the majority of Jordan's biological diversity. These 12 areas make up the network of Jordan's protected areas. In 1998, RSCN has carried a review of the protected areas network and has further proposed six more protected areas. So, the total number of areas that should become part of the

protected areas network is eighteen. Up to date, seven protected areas (reserves) have been established.

- Special attention was directed to other zones outside protected areas. These zones have significant conservation importance due to their great diversity of species and habitats. They consist of important bird areas, important wetland areas, marginal areas at national borders (protected by the army) and wildlife corridors. In 1995, Bird life International in cooperation with RSCN defined and globally declared 27 areas in Jordan as important bird areas covering a total area of 7600 $km^2$ about 8.5 % of the total area of Jordan. Seven of these sites are already protected areas and the other ten are proposed, on the other hand thirteen important wetland areas were identified to help protection of nationally and internationally important water birds and other threatened birds.

- Jordan also poses other special habitats such as its forests. The juniper forests are the world' s most northerly distribution of this species, and the pine forests are considered the most southerly distribution of that kind of forests. Such habitats are of significant economic value to Jordanian society if properly conserved and managed as they could generate revenue from eco-tourism and forest management. A remark progress is achieved in cooperation between RSCN and Forestry Department.

- The country has taken several steps in the field of raising public awareness, formulating policies and strategies, enforce legislations, improve national, regional and international cooperation, and finally documenting the national biodiversity work both in research and nationally-organized meetings.

- Several research programs and baseline surveys have been conducted inside protected areas and to lesser extent outside them. These research activities were mainly promoted by the RSCN to meet its principle objective, which is conserving representative sites, and its wild species through shaping and improving management plans for these sites. Other research activities have taken place by academic institutions and voluntary work. One of the major studies that is carried out outside protected is the National Water bird Census, which the RSCN has been implementing, in coordination with Wetlands International, in all major wetlands and water bodies of the country since 2000.

- Jordanian universities and academic institutions play a major role in nature conservation. This is mainly achieved through carrying out ecological research. Other than that, some universities such as Jordan University, Yarmouk University and Hashemite University have Herbaria that work as ex-situ conservation centers for plants of all the different habitats in the country. It should also be mentioned that several professors from all different universities

work through their universities on supervising a lot of the ecological research that is being carried out in the country. Also, tissue culture technique can be considered in some cases as a conservation tool that is used in some university laboratories in order to propagate some plant species.

- The National Biodiversity Strategy and Action Plan constitute a major contribution to the country's development plan. This strategy was released in the year 2003. the strategy envisage that land, water, pasture, terrestrial and marine ecosystems as well as wildlife and aquatic resources in particular are central to agriculture, fisheries and tourism development. Also, it envisages habitat protection, natural resource conservation and sustainable use options offer significant opportunities for demonstrating that conservation of biodiversity represents a vital investment in future sustainability of Jordan's economic and social development.

- While the importance of *in-situ* conservation cannot be overemphasized, *ex-situ* conservation (conserving biodiversity outside of the original habitats) in zoos, aquaria, botanic gardens and germ plasm banks may contribute to species-at-risk conservation by maintaining viable populations of species threatened in the wild, providing educational and public awareness services, and serving as sites for basic and applied research.

- Captive breeding programs were established by the Royal Society for the Conservation of Nature to breed and reintroduce some of the nationally extinct animals including Arabian Oryx (*Oryx leucoryx*), Roe Deer (*Capreolus capreolus*), Blue-necked Ostrich (*Struthio camelus molybdophanes*) - the closest subspecies to the globally extinct Syrian Ostrich (*Struthio camelus syricus*) -, Asiatic Wild Ass (*Equus hemionus onager*) - the closest subspecies to the globally extinct Syrian Wild Ass (*Equus hemionus hemippus*).

- The Forestry Seed Center was established in 1992 within the Department of Afforestation and Forests with assistance provided by the German Technical Cooperation (GTZ). The main objective of this center is to secure high quality forest seeds through: selection, collection, processing, certification and handing these seeds.

- Jordan established a Genetic Resources Unit (GRU) in 1993 at the National Center for Agricultural Research and Technology Transfer (NCARTT)/Ministry of Agriculture through a project proposal supported by the United States Agency for International Development (USAID).

- The conventions and legislation for environmental protection are playing a major role in protecting species at risk. Eighteen acts and eight regulations were issued in Jordan, including provisions for the protection of the environment.

Most of these acts are being implemented through different government agencies. The 1995 Environmental Law No. 12 and the 2000 Agricultural Law No.44 has articles dealing with animal protection that would help in decreasing pressures on species at risk.

- A review for the protected areas network has been done and it recommended that at least 4% of each vegetation type (13 different vegetation type all over Jordan/Refer to Vegetation Types table & Map in Annexes) should be included in the network. As a result, 6 additional protected areas are to be added to the proposed sites and that make the total number to 18 (6 established & 12 proposed) the total area for the established protected area is 1.56% of the country's total area. The national target has recently been planned to exceed the global target, were it is Jordan target to reach 12% of Jordan total area established as protected areas in the year 2012(including six nature reserves planned by the RSCN to be established in the near future). And to approach 15% in the year 2017. .

- The National Environment Strategy for Jordan was produced in August 1991, and was co-sponsored by the Government and the U.S. Agency for International Development. Technical assistance was provided by the World Conservation Union (IUCN). The strategy provides a policy and planning framework for environmental protection in Jordan and incorporates over 400 recommendations and actions. It remains the principal strategic vehicle guiding government and NGO activities. Under the sectoral heading wildlife and habitat the strategy identifies the creation of new reserves as a national priority:

- The Ministry of Agriculture has delegated the implementation of wildlife protection (2000 Agricultural Law No.44) to the RSCN, recognizing it as one of the agencies aiding in the enforcement of hunting laws. Other agencies that share in this task include the Forestry Department rangers, the army and the police. Still, many seem to believe that enforcement is the only responsibility of the RSCN. The RSCN is currently the leading organization in implementing this law, but this NGO, with its five rangers, cannot enforce the law all over Jordan. To overcome this misunderstanding and improve the law enforcement, networks were established between the RSCN and the police and between the RSCN and the Ministry of Agriculture. These networks will hopefully enhance law enforcement within the country. Public awareness programs were also carried out to promote enforcement of agricultural law.

- During the early stages of 2006 an innovative system for "environmental police" had been developed to coordinate the activities of the police department, Ministry of Agriculture, Ministry of Environment and RSCN. The environmental police system had been established since the end of 2006.

- The institutions involved in the conservation of biodiversity include both governmental and civil society institutions, the most relevant governmental institutions are: the ministry of Environment; the Ministry of Agriculture; the Ministry of Planning and International Cooperation, the ministry of Water and irrigation; and the National Center for Agriculture Research and Technology Transfer. While, the most relevant non-governmental institutional is the RSCN. Jordanian universities play a very important role in the field of research and studies, in addition to its prime role of capacity development at the national, regional and international levels.

- Introduction of alien species is one of the major threats to the native animal species. They can also become pests by causing destruction to natural habitats and agricultural areas. On the other hand, feral species, which invaded the country long time ago, might affect their wild relatives through competition and interbreeding. Exotic species are usually capable to adapt to habitat change. Some of these species might have the same effect as alien species in that they destroy natural habitats and agricultural areas. Ministry of Environment and Ministry of Agriculture are trying to control and monitor invasion of alien species through the country in cooperation with RSCN and Border Authority.

- The efforts are concentrated on controlled dissemination and trading with animals through the country, strong legislation approved by the government to control dissemination of animals, effectively applied law enforcement and effective public awareness programs directed to decision-makers and public.

- Jordan does not have a specific law that prohibits the introduction of alien species or controls invading species on ecological grounds but several bylaws and regulations could serve the purpose. Jordan also few studies and strategies pertinent to the topic. Jordan has identified some invasive fish species in Jordan River, Indian crow in Aqaba Port, and American cockroach in different areas of the towns. Also roadside plantation program introduced some alien species imported from abroad. For example, legumes to ornament the side of roads have caused some allergy to Jordanians. Few examples relevant to this topic are found in Jordan, including:

  - In Regulation for the Development of Wadi Rum Area No. 24 for 2001, Article 9-A-10 states that it is prohibited to enter “exotic (alien) animal or plant species to Wadi Rum area”.
  - Article 12-B-6 of the Regulation for the Marine Aqaba Park No. 22 for 2001 states that it is prohibited to enter “exotic (alien) animal or plant species into the Park’s area”.
  - Azraq Wetland Reserve Management Plan addresses this topic and sets actions to eradicate alien species and enhancing/restoring affected species, primarily for the Azraq Killifish.

- The enforcement of the CITES convention and the measures taken within the established nature reserves are considered as the only approaches in Jordan work on alien invasive species. However, it is expected that the intended Integrated Ecosystem Management Project in the Jordan Valley will address this issue and may consider ecosystem approach and precautionary and bio-geographical approaches as appropriate in its work on alien invasive species.
- Nevertheless, these regulations are site-specific and do not correspond to Jordan as a whole. Until now, legislations addressing the control of invasive and alien species on the national level have not yet been developed.

❖ **Main Threats to the Biodiversity:**

| No | Threat | Root Cause |
|---|---|---|
| 1 | Fragmentation of habitats | • Agricultural encroachment<br>• No applied land use strategies<br>• No guideline policies on conservation with development agencies<br>• Unregulated urban and infrastructure expansion<br>• No clearly mandated management agency |
| 2 | Inappropriate agricultural development | • Lack of comprehensive land use strategy<br>• No conservation-orientated policies or extension services<br>• Weak coordination between farmers and gov'nt agencies<br>• High water demanding crops |
| 3 | Water pollution | • Excessive agrochemical use<br>• Inadequate guidelines on use of agrochemicals<br>• Minimal sewage treatment<br>• Inadequate controls on industrial effluent |
| 4 | Air pollution | • Inadequate controls on industrial emissions |
| 5 | Solid waste | • Lack of treatment infrastructure |
| 6 | Excessive hunting pressure | • Inadequate enforcement of laws<br>• · Declining bird populations |
| 7 | Excessive grazing pressure | • Inadequate enforcement of<br>• regulations<br>• Lack of grazing land<br>• · Limited alternative livelihoods |
| 8 | Tree cutting | • Inadequate enforcement of regulations<br>• Limited fuel supplies for subsistence communities<br>• · Lack of alternative livelihoods |
| 9 | Unregulated tourism development | • · Inadequate planning and enforcement of regulations |
| 10 | Over-extraction of water | • Lack of coordinated strategy between government and users |

| | | |
|---|---|---|
| | | • Weak enforcement of regulations (EIAs)<br>• Lack of water conservation technologies<br>• High water demanding crops<br>• No coordination between supply and demand |

❖ **Protected Areas:**

❒ *"Nature reserves…..are established and managed by the RSCN. The RSCN completed a study outlining the establishment of 12 nature reserves covering all environmental and climatic areas in Jordan and its wild animals and plants (the Clarke study). Seven such reserves have been established so far (including those under development). The committee recommends that the establishment of reserves be continued and their protection and management be supported. The Council of Ministers has approved this initiative….(National Environment Strategy 1992, page 67)*

❒ Decades ago, the RSCN was handed over the responsibility and mandate to manage protected areas in coordination with the Ministry of Agriculture and other related governmental bodies. A draft national parks policy was developed in 1996 to include guidelines on developing and managing national parks, but the policy has not been endorsed. However, the Environmental Protection Law requested in Article (23)(A) the Cabinet Council to issue Regulation of Nature Protection and Regulation of natural reserves and national parks. There are two national laws related to the establishment and management of protected areas: the Agricultural Law and the Environmental Protection Law.

❒ Recently, the Ministry of Environment signed a memorandum of understanding with the RSCN concerning the establishment and management of protected areas, the Ministry delegated the management responsibility of protected areas to the RSCN according to the environmental law.

❒ A national protected areas review was carried out in 1998 in order to study the already proposed protected areas in the country and nominate new sites in order to have enough representation of all vegetation types in all protected areas. Later after this review was carried out, two more protected areas were established (Rum Protected Area and Dibbeen Nature Reserve).

❒ Currently seven terrestrial and one marine reserve have been established, eleven more terrestrial reserves are proposed to be established. Also, several grazing reserves are established in the eastern Badia. The border areas are considered partially protected since human activities within these sites are limited to limited Bedouin (indigenous nomadic population of Jordan) especially for nomadic grazing. 27 Important Bird Areas (IBAs) have been identified, significant portions of which are protected since these portions are located in

established protected areas, many (un protected) IBAs are located in proposed protected areas and expected to be protected in the future, and few are not expected to be protected as protected areas at least in the short and medium runs. Also, 13 Important wetlands are identifies according to the Directory of Wetlands including one Ramsar Site: Azraq wetland.

- RSCN started the process of having proper management plans for its' reserves starting 1994, with the big aid from UNDP/World bank-Global Environment Facility. From that date, RSCN managed to prepare management plans for Dana, Azraq, Mujib and currently preparations for Rum management plan is in the final stages and initial work for Ajloun plan has already started.

- The management plans represent a reference for all staff working on-site and in the headquarters at RSCN, these plans consist of several sections which cover the following:

  - ✓ Introduction about the site
  - ✓ Scientific & non-scientific data about the site: Species, Habitats, Geology, Hydrology, Climate, Human activities, Socio-economic background…etc.
  - ✓ Analysis for all data
  - ✓ Impacts & threats for the sites and their biodiversity
  - ✓ Suggestions for appropriate management.
  - ✓ Objectives and operational objectives for the plan
  - ✓ Activities in a time table
  - ✓ Monitoring & follow-up for the plan

- The National Environmental Action Plan (NEAP) was produced in 1996 by the Ministry of Planning as a follow-up to the National Environment Strategy. It defines the priority actions required for dealing with the major environmental problems of Jordan, as determined through an intensive workshop involving representatives of all relevant institutions, both government and non-government. The process was coordinated by the Ministry of Planning (MOP) and the Ministry of Municipal and Rural Affairs and Environment (MMRAE) with support and advice from the World Bank. The main recommendations concerning protected areas are:

  - ➢ It is essential to expand the protected areas network and allow RSCN to manage the planned 12 Nature Reserves in the next few years, covering 4% of the country's area. It is also working in producing a network of protected areas.

  - ➢ Reserve management plans must be developed to support the conservation of habitats and wildlife involved.

- Promote the involvement of local communities in development and management of archaeological and historic sites as well as nature reserves. Their active participation should yield significant income for local people. In addition to the on-site institutional development, training in tourist management must be provided.

- Besides the involvement of local communities at the sites it is essential to undertake public awareness campaigns that aim at public participation in preserving the amenities. Also information and details regarding the sites has to be documented and made available to visitors.

❒ Jordan does not, as yet, have an officially endorsed policy on protected areas. There is, however, a draft policy framework produced under the auspices of the Ministry of Planning in 1996. This framework was prepared with technical guidance and financial support from USAID. Its preparation involved a number of workshops with relevant Jordanian organizations, both government and non-government, in order to secure consensus on key policy issues and priorities. The suggested policy framework, together with the findings of the workshops, were published in July 1996 in a report entitled "Jordan Parks Policy Project", but no action has since been taken to develop and ratify these draft polices

❒ **Fundamental Jordan Protected Area policies**

- Jordan Protected Areas (JPAs) will conserve the natural, cultural, archaeological, and scenic resources of the kingdom, while leaving them unimpaired for use and enjoyment by future generations. Visitor use, scientific study, education, and public enjoyment should be encouraged, but only in such a manner that will not adversely affect the resource.

- JPAs will be designated through a process of evaluation using the "Selecting Areas for a JPA system Criteria." An approved set of formal criteria will be applied during the designation process to assess significance. Additions to the JPA system will be strategic, and the system will expand in conjunction with the availability of the staff and financial resources to meet protection and operating requirements.

- The system should represent a full spectrum of significant Jordan flora and fauna, ecosystems and natural habitats as well as sites of important archaeological and cultural interest, and artifacts from important events in history. Proper selection of areas designated as JPAs will produce a nation wide system of representative sites, with priority given to the finest example of the nation's natural resources, outstanding

archaeological artifacts and sites illustrating or commemorating the most significant events in Jordan's history.

- If the resource will be adversely affected by certain extractive activities - water removal, mining, grazing and controlled hunting are examples - such uses should be controlled or prohibited. Where visitor use and outdoor recreation activities are allowed within the JPA system, special care must be taken that natural, archaeological or cultural features are not substantially disturbed or artificially introduced to the scene. Recreation and leisure are appropriate activities across most of the JPA categories but major resource modification or impact are not appropriate in a JPA.

- JPAs will normally be established through an agreed-upon national strategy based on approved criteria, incorporating where possible existing protected areas, whether public or private. Where this is not the case, existing expropriation laws may apply. In cases in which public land ownership is not imperative, a variety of compensation tools are available. For new JPA areas, displacement of resident inhabitants is an option only in cases involving extreme resource degradation.

- Since the successful protection of significant resources and the quality of visitor experience do not stop at JPA boundaries, decisions regarding JPAs should make maximum use of land-use management tools such as clearly defined buffer zones, to protect the resource integrity on site and in adjacent areas.

❖ **The Current Reserves:**

❒ **Dana Biosphere Reserve:**

✓ Established in 1989, Dana Biosphere Reserve is Jordan's largest nature reserve, covering some 320 km2 of rugged and beautiful landscape along the face of the Great Rift Valley. It sweeps down in a series of mountain ridges, from the 1500m high plateau near Quadesiyya to the desert plains of Wadi Araba. The mountains are cut by many steep-sided wadis, often lined with a lush growth of trees and shrubs. Its geology is as varied as its landscape, switching from limestone to sandstone to granite.

✓ Dana Biosphere Reserve is the only reserve in Jordan that includes the four different bio-geographical zones of the country; Mediterranean, Irano-Turanian, Saharo Arabian and Sudanian penetration. As such, it is the most diverse nature reserve in the country in terms of habitats and species, hosting several vegetation types, including the Phoenician Juniper, evergreen oak, sand dunes, acacia, and rocky sudanian, among others. It is also home to the southernmost remaining forest community of Cypress *Cupressus simpervirens.*

- ✓ More than 800 plant species can be found within the reserve, three of which have only ever been recorded in Dana and nowhere else in the world. Their Latin names include the word 'Dana' in them.
- ✓ Dana supports a wide variety of wildlife, including many rare species of plants and animals. It is home to several globally threatened species of birds and mammals, such as Syrian Serin *Serinus syriacus*, Lesser Kestrel *Falco naumanni*, Blanford's Fox *Vulpes cana* and Nubian Ibex *Capra nubiana*. The largest breeding colony in the world for Syrian Serin is located in Dana, while the Lesser Kestrel is also found to breed in the area.
- ✓ In 1994, funded by the Global Environment Fund (GEF), RSCN took pioneering steps in its attempt to conserve the precious biodiversity in Dana, putting together the first protected area management plan in Jordan, and making Dana Biosphere Reserve into a model of integrated conservation and socio-economic development. This plan set objectives, strategies, and priorities that ultimately seek to find a balance between protecting Dana's natural wonders and meeting the needs of local people. This strategy mostly based on the concept of zoning, defining areas where certain activities can or cannot happen, allowing for grazing zones and recreation zones. Following this approach, Dana became the first site in which responsible tourism began taking place.
- ✓ To date, RSCN has received several global awards for its success in alleviating poverty and creating job opportunities for local communities, in combination with integrating nature conservation.
- ✓ Major threats to the natural environment of the area still include overgrazing, woodcutting, and hunting, mainly of Ibex and Chukar.

❒ **Mujib Nature Reserve:**

- ✓ Established in 1987, Mujib Nature Reserve covers an area of 212 km2. Bordering the Dead Sea at 416 meters below sea level, the Mujib Nature Reserve surrounds Wadi Mujib, a deep and majestic canyon that cuts through the rugged highlands and drains into the Dead Sea. Seasonal and permanent streams flow through many of the wadis, supporting luxurious aquatic plants in the river-beds. These rivers also enable this otherwise arid area to support a remarkable diversity of wildlife. It is also one of the major sources that compensate the high evaporation rate of the Dead Sea
- ✓ Surveys indicate that the reserve contains over 300 species of plants, 10 species of carnivores, and numerous species of resident and migratory birds. The richest vegetation is found in the wadi beds where there are Palm Trees, in addition to Wild Fig, Tamarix trees and beautiful Oleander shrubs, in addition to the Reedbed along the river.
- ✓ The steep mountain slopes support several highly adapted mammals, including the Rock Hyrax, the Eurasian Badger and, most importantly, the Nubian Ibex, a large mountain goat. Today, only a small number of Ibex remain in the wild due to widespread illegal hunting. In order to save this animal from extinction, RSCN finished a ten year re-introduction program for the Ibex in the reserve, where the captive bred animals were kept.
- ✓ Many carnivores inhabit the various vegetation zones in Mujib. The Caracal, a medium sized cat with black and white ear-tufts, lives in rocky wadis. It is a

powerful and agile hunter with great jumping power, known to catch flying birds in its paws.

- ✓ Mujib is also an internationally important passage way for migratory birds. Huge numbers of White Storks passed through every year starting from August, Black Storks, Buzzards, Honey Buzzards, Levant Sparrow Hawks, and much more. The globally threatened Lesser Kestrel breeds in the reserve every spring. The breeding population reaches some times 0.1 % of the globally estimated population. At least nine species of birds of prey are known to breed in the reserve, significantly Bonelli's eagle, Short-toad Eagle, Long-legged Buzzard, and Barbary Falcon.

❒ **Shaumari Wildlife Reserve:**

- ✓ In 1975, RSCN began fencing areas within Shaumari in preparation for the first wildlife protection reserve in Jordan, covering an area of 22 km2. Shaumari Reserve acted as the first model reserve in Jordan's dry desert climate, providing grounds for learning practical application methods in establishing and managing other reserves around Jordan. It is comprised of two main topographic features, desert wadis and hammada areas. Desert wadis form around 65% of its total area, the most well-known being Wadi Shaumari, which cuts straight through the heart of the site, giving the reserve its name. Hammada areas occupy the remaining 35%, covering the area with a layer of black flint. Shaumari provides an open location for Jordanian Universities undergoing scientific research on arid and semi-arid areas.
- ✓ Shaumari has been found to support highly varied biodiversity. So far, more than 193 species of flora have been recorded at the reserve, the most common species being *Achillea fragrantissima, Artemisia sieberi, Matricaria aurea, Haloxylon persicum, Anabasis articulata, Retama raetam* and *Peganum harmala*. Six species of carnivores have been found to inhabit the area, including the Red Fox *Vulpes velpes*, Jackal *Canis aureus*, Wolf *Canis lupus,* Striped Hyena *Hyaena hyaena*, Caracal *Caracal caracal*, and Wild Cat *Felis sylvestris*, while bird sightings in the reserve include Imperial Eagle *Aquila heliaca*, Pallid Harrier *Circus macrourus*, and Egyptian Vulture *Neophron percnopterus.*
- ✓ Shaumari Wildlife Reserve was initially created as a breeding center aiming to breed and reintroduce the globally threatened and locally extinct wildlife and specifically the Arabian Oryx *Oryx leucoryx*. In 1978, joined by international efforts, RSCN initiated the Arabian Oryx rescue operation after receiving 4 Oryx animals from the Phoenix Zoo, USA, into specially prepared breeding enclosures in Shaumari Reserve, in an attempt to return the Arabian Oryx to its native desert habitat. By 1983, this operation met its first success, after the release of 31 Arabian Oryx from captivity into their native habitats within the reserve.
- ✓ Shaumari Wildlife Reserve is now home to some of the rarest species of animals in the Middle East, such as Ostriches *Struthio camelus*, Goitered Gazelles *Gazella subgutturosa* and Persian Onagers *Equus hemionus*. RSCN has exerted great effort to help these animals rebuild their populations and reassert their presence within the safety of the reserve, protected from the hunting and habitat destruction that nearly wiped them out.

- ✓ Visitors to Shaumari have an opportunity to see the living results of this global co-operation. The Oryx can often be seen roaming freely in the desert grassland, and the Ostriches, Gazelles, and Onagers can be observed in their enclosures. As a model of environmental education that is suitable for all levels of learners, the reserve has become a popular spot for children and school outings.

❒ **Ajloun Forest Reserve:**

- ✓ Established in 1987, Ajloun Forest Reserve covers an area of 13 km2 located in the Ajloun highlands north of Amman. It consists of Mediterranean-like hill country, ranging from 600 - 1100 m above sea level, with a series of small and medium winding valleys.
- ✓ Ajloun forest was first proposed as a protected area in the 1978 survey. Its ecological importance is represented by the Evergreen Oak vegetation type, which is typical of the northern highlands of Jordan. As part of the Mediterranean bio-geographical region of the country, it is dominated by open woodlands that account for a significant part of Jordan's forested area, which does not exceed 1% of the country's entire land area.
- ✓ Along with stretches of Evergreen Oak *Quercus calliprinos*, the thriving woodlands of Ajloun are dominated by Carob *Ceratonia siliqua*, wild Pistachio *Pistacia palaestina* and Strawberry tree *Arbutus andrachne*. Throughout the years, these trees have been important to local people for their wood and quite often for their medicinal and nutritional value or simply as a food source. These woodlands also support a wide range of plant and animal biodiversity, including herds of wild boar *Sus scrofa*, the Stone Marten *Martes foina*, which is a carnivore that is known to be restricted to forest habitats, and the golden Jackal *Canis aureus*, which can still be found in good numbers in and around the reserve, as well as the Red Fox *Vulpes vulpes*, Striped Hyena *Hyaena hyaena*, Persian Squirrel *Sciurus anomalus*, Indian Crested Porcupine *Hystrix indica*, and wolf *Canis lupus*. A wide variety of wild flowers thrive in Ajloun forest, including the Black Iris, several orchids and wild tulips, several of which can be found in CITES appendices. In 2000, Ajloun Forest Reserve was announced, by BirdLife International and RSCN, as an Important Bird Area in Jordan.
- ✓ After the reserves establishment, RSCN initiated a captive breeding program aiming to reintroduce the locally extinct Roe Deer *Capreolus capreolus*. The Roe Deer is adapted to forest habitats, and feeds on a variety of trees, shrubs and grasses. The rich forests that covered the Ajloun area once provided an ideal habitat for this noble creature, but deforestation over the past 200 years led to the extinction of the Roe Deer in Jordan. Since launching its captive breeding program at Ajloun Forest Reserve in 1988, RSCN has managed to release a number of Roe Deer into the reserve, where they have continued to grow within their natural habitat.
- ✓ Ajloun Forest Reserve still faces several threats, as the shape of the reserve and its borders have been negatively affected by the presence of private lands around it. Presently, this has led to several problems in managing the reserve, due to the existence of many unofficial access points into the reserve, allowing

people to enter the reserve for the illegal purpose of woodcutting, grazing or hunting.

- ✓ Nonetheless, Ajloun Forest Reserve has one of the most effective outreach and public awareness programs among Jordan's nature reserves. This has led to the raised awareness of the local communities inhabiting the area, emphasizing the importance of the reserve and its maintenance. For this reason, RSCN has managed to establish several initiatives of cooperation between the reserve and the people living around the reserve.

❒ **Dibeen Forest Reserve**:

- ✓ In 2004, RSCN established its latest nature reserve in Dibeen Forest northern Jordan. Dibeen Forest Reserve extends over 8.5 km2 of mountainous terrain, covering an area of pristine pine-oak habitat (*Pinus halepensis-Quercus calliprinos*). These Aleppo pines are some of the oldest and largest in the Kingdom, and are the defining characteristic of this landscape, representing the southeastern geographical limit of this forest type. Dibeen is the driest part of the world in which the Aleppo pines are known to grow naturally, with an average rainfall of around 400mm per year.
- ✓ Dibeen was ranked as the top priority site for conservation in the 1998 Protected Areas review, after being overlooked in the original 1979 review, as studies have revealed that Dibeen is one of the best remaining examples of the original pine-oak forest cover in the region and supports at least 17 threatened species, like the Persian Squirrel, and other globally significant biodiversity.
- ✓ The entire forest of Dibeen extends over an area of 60 km2, varying in altitude from 500m to 1000m above sea level. The forest is spread over steep to very steep slopes of limestone or chalky limestone rock types. The physical and age structure of the forest as a whole is remarkably varied with trees of widely different ages and sizes and a distinct under-canopy in many areas. This variety is aided by the presence of wadis, which provide different aspects, moisture levels and soil conditions throughout the forest.
- ✓ The reserve is positioned in the core of this forest, encompassing three main stand types in the core area, distributed according to altitude. In the lower elevations, Aleppo pine (*Pinus halepensis*) is dominant and there are some pure stands with large mature trees. In the middle elevations, a pine-oak (*Pinus halepensis / Quercus calliprinos*) association is dominant and this extends over the majority of the area. In the upper elevations, the oak succeeds as the dominant species with small stands of deciduous oak (*Quercus infectoria*) on the upper most slopes. Other trees present in the forest include Strawberry tree (*Arbutus andrachine*), pistachio (*Pistachia palestina*) and wild olive (*Olea europea*); while the ground flora is exceptionally rich and includes several orchid species and other forest related plant species.

❒ **Azraq Wetland Reserve:**

- ✓ In 1978, RSCN established Azraq Wetland Reserve to conserve the uniquely precious oasis located in the heart of Jordan's eastern desert, between a limestone desert in the west and a basalt desert in the east. It is distinguished

by lush marshland and natural water collections that form glittering pools and streams, giving Azraq its name, which is the Arabic word for 'blue'.

- ✓ In 1977, the Ramsar Convention declared Azraq Wetland and the adjacent mudflat (Qa) as a major station for migratory birds on the African-Eurasian flyway. A variety of birds flock to the reserve each year, stopping for a short rest along their migration routes, staying for the winter, or breeding within the wetland. The Azraq wetland is the only oasis in the Arabian Desert with a self-replenishing system that has allowed it to sustain itself throughout the years.
- ✓ Unfortunately, the wetland suffered an environmental disaster because of abuse and overuse of water from the Azraq Basin. Due to excessive pumping of water from the oasis to large urban areas and the illegal drilling of artesian wells for agricultural purposes, water levels have steadily dropped over the course of 50 years, starting to decrease significantly in 1981 and reaching alarming rates in 1993. These high levels of water extraction resulted in the extreme depletion of this natural oasis, drying up massive areas of invaluable wetland equaling over 25 km2. In 1992 the main springs which were feeding the wetland had dried out and water level reached a depth of 12 meters below ground level. The water body that used to be a thriving ecological hotspot has dwindled alarmingly to cover 0.04 % of the area it used to cover in the past; the effects of which can be clearly seen in declining numbers of birds stopping over in Azraq wetland on their migratory route.
- ✓ Before water pumping dramatically increased in the 1980s, the oasis provided a sparkling blue jewel in the desert, attracting up to a million migrating birds at one time, as it marks one of the major bird migratory routes. At times, an upwards glance at the Azraq sky would find it teeming with masses of birds, blocking out the light of day. By 1993, the extraction of water was so great that no surface water remained and the oasis's ecological value was virtually destroyed.
- ✓ With international support, RSCN began a rescue effort in 1994 and managed to restore a significant portion of the wetland, and aims to increase depleted water levels by 10 percent. So far, this target has not been achieved due to continued water pumping, lack of manpower, and a lack of experience in wetland management. However, thanks to RSCN's efforts, many birds for which Azraq was once renowned for are coming back, and special boardwalks and bird hides have been constructed to enable visitors to observe and enjoy them.
- ✓ The wetland is a location of rich biodiversity, providing a natural habitat for numerous aquatic and terrestrial species, including the Azraq Killifish *Aphanius sirhani*, the only true endemic vertebrate species of Jordan. Due to the degradation of the species native habitat, the killifish is a critically endangered species as identified by the World Conservation Union IUCN. Restoration work has been done on its habitat, in order to protect the species from extinction. RSCNs efforts have been highly effective in this area, greatly increasing the numbers of killifish in their natural habitat.

❒ **Wadi Rum Protected Area:**

- ✓ Wadi Rum Protected Area is one of the world's most outstanding desert landscapes, covering 720 square kilometers of dramatic desert wilderness in the

south of Jordan. Its huge mountains and broad sandy wadis are home to several Bedouin tribes and a surprising range of desert wildlife. This wildlife now includes a herd of Arabian Oryx, reintroduced by RSCN in 2002.

- ✓ The breathtaking scenery of Wadi Rum has made it one of the most popular tourist sites in the Kingdom. But the growing pressure from visitors, and especially off-road vehicle tours, is damaging Wadi Rum's scenic and ecological values.
- ✓ RSCN has been helping in preparing a management plan for Rum under a contract with the Aqaba Special Economic Zone Authority (ASEZA), which tries to reconcile all of these problems within a conservation framework.
- ✓ When the contract expires, ASEZA will assume management responsibility for the protected are, while maintaining a working relationship with RSCN to secure its involvement in the ongoing management of the site.

❖ **Proposed nature reserves:**

❒ The 1978 and 1998 surveys of Jordan's wild places identified several sites of exceptional wildlife and landscape value. These sites need special care and management. RSCN has managed to develop management plans for six of these nature reserves. At present, five other sites identified in the surveys are proposed as national priorities for designation as protected areas. Each proposed protected area has some unique qualities that qualify it to become a fully functional nature reserve. Below is a brief description for the top priority proposed nature reserves and the threats they face.

- ➢ Burqu' (Proposed area 700 km2)
- ➢ Yarmouk River (Proposed area 30 km2)
- ➢ Fifa (Proposed area 27 km2)
- ➢ Qatar (Proposed area 50 km2)
- ➢ Jabal Mas'uda (Proposed area 460 km2)
- ➢ Aqaba Mountains (Proposed area 59 km2)
- ➢ Rajel (Proposed area 908 km2)
- ➢ Abu Rukbeh (Proposed area 189 km2)
- ➢ Bayer (Proposed area 461 km2)
- ➢ Jarba (Proposed area 40 km2)
- ➢ Jordan Valley(Proposed area 8 km2)

❒ **Burqu' nature reserves:** (Proposed area 744 km2)

- ✓ Burqu' is a part of the unique black basalt desert of the eastern Badia. It contains an important wadi, which was dammed in Roman times to create a water reservoir. This reservoir with its adjoining mud flats is a site of international significance for migrating birds.
- ✓ The surrounding desert also provides refuge for many desert animals, including the petite and extremely rare sand cat *Felis margarita*, the Rupell's fox *Vulpes rueppelli* and the desert gazelle *Gazella dorcas*. Its plant life is equally exciting, with over 200 species recorded, many of which were identified in Jordan for the

first time. The main threats are overuse of the reservoir water by Bedouins, excessive grazing, and over-hunting.

❒ **The Yarmouk River valley nature reserves:** (Proposed area 30 km2)

✓ The Yarmouk River valley where it borders Israel has been left largely undisturbed due to its strategic location. As a result, it still supports a wide variety of plant and animal communities typical of intact and unpolluted river systems. The area includes important woodlands of deciduous oak trees, the largest of the oak tree species found in Jordan. It also supports many rare animals, including the locally endangered and globally near-threatened river otter *Lutra lutra* and the globally threatened mountain gazelle *Gazella gazella* and one species of fish found only in the Yarmouk catchment.

✓ The area is also very important for birds, especially birds of prey like Griffon vultures *Gyps fulvus*. The main threats are water extraction, sewage pollution, uncontrolled agriculture, grazing and increasing visitor pressure.

❒ **Fifa nature reserves:** (Proposed area 27 km2)

❒ Fifa lies at the southern end of the Dead Sea, near to the national border. It contains remnants of the sub-tropical vegetation which was once common throughout the Jordan valley. It is made ecologically exciting by fresh water streams that have created an oasis in an otherwise arid and salty area.

❒ This oasis attracts many migrating birds and supports many unusual plants. At least 7 plants in the site are of national conservation importance and one, *Salvadora persica*, is found nowhere else in Jordan. A wide range of large animals is also present here, including the Syrian wolf *Canis lupus* and the majestic caracal *caracal caracal*.

❒ **Qatar nature reserves:** (Proposed area 50 km2)

✓ Lying nearly flat around 43 – 50m above sea level, Qatar is a part of the Jordan Rift Valley that represents the Acacia-subtropical vegetation and the Sudanian bio-geographical zone with annual rainfall of 50mm. This site is part of Wadi Araba, about 40 km north of the Gulf of Aqaba.

✓ The area is composed of different habitats, including Acacia woodland, sand dunes and mudflats. The density of acacia trees in Qatar area is the highest in the country. The proposed protected area in Qatar is separated from the Aqaba Mountains by Aqaba-Dead Sea road. Qatar village is located nearby the study area, but it is too small to have an impact on the site.

❒ **Jabal Mas'uda nature reserves:** (Proposed area 460 km2)

✓ Jabal Mas'uda is located in the southern part of Jordan, in Ma'an Governorate. The name of the site was taken from the highest mountain peak in the area. The site has an elevation range from 180m to 1500m and contains three bio-geographical zones: Mediterranean, Irano-Turanian and Saharo-Arabian. It lies

in a region including parts of the Southern Escarpment, Esh Sharrah Plateau and the Rift Valley Desert.

- ✓ The diversity in the landscape in the area is unique where one can pass through not less than seven vegetation types by only driving along the road that crosses through the reserve. These vegetation types cover extremes of the vegetation of Jordan from Juniper in the highlands of the area down to sand dunes and acacia trees along the wadis in the lowlands of Wadi Araba.

❒ **The Aqaba Mountains nature reserves:** (Proposed area 60 km2)

- ✓ The proposed protected area lies at the south eastern Aqaba port, and consists of many narrow wadis among a series of steep granite mountains. The area represents the Sudanian bio-geographical zone with Acacia-subtropical vegetation, and creates an ideal habitat for biodiversity that is typically found in the Jordan Rift Valley.
- ✓ The Aqaba Mountains have remained mostly free of human impact, except for the presence of some small Bedouin tribes, which present a threat in the form of over-grazing and wood-cutting.

❒ **Wadi Rajel nature reserves:** (Proposed area 908 km2)

- ✓ As a part of the eastern desert, Rajel derives its name from the main wadi that goes through the area, lying northeast of the Azraq oasis. The proposed protected area ranges from flat lands to minor hills, with elevations ranging from 550m to 800m, with its main topographical features being Hammada and several deep wadis.
- ✓ Rajel represents the only water body in the area, which causes floods during hard rains. The area contains a number of rare and threatened animals and plants.

❒ **Abu Rukbeh nature reserves:** (Proposed area 190 km2)

- ✓ Abu Rukbeh is located east of Karak, and is characterized by a complex typography, consisting of flat areas and high hills of gravel and flint, which are surrounded by a number of valleys.
- ✓ The area ranges in elevation between 700-1050 m above sea level, making it very rich in biodiversity. It consists of three bio-geographical zones: Irano-Turanian, Saharo-Arabian, and penetrations of Mediterranean.

❒ **Bayer nature reserves:** (Proposed area 190 km2)

- ✓ Located in the Eastern Desert, Bayer derived its name from the main wadi that cuts through the main area in the region. Ranging from 750-1060 m above sea level.
- ✓ Bayer consists mainly of a number of overlapping valleys and a series of hills, and the terrain is composed of limestone and flint rocks. Bayer represents the

Saharo-Arabian bio-geographical zone. It has been relatively conserved due to low rate of human activity in the area.

❖ **Main problems facing Wildlife reserves:**

- Although huge efforts were done by RSCN from year 1966 till now, in the field of nature conservation, and with the GEF/World Bank projects which started in 1994 and lead to Site management plans based on sound scientific researches and monitoring, the Wildlife reserves still face lot of problems and obstacles.

- Lack of effective legislation and laws enforcement, represents a major part of the reserves' problem. Since these sites are managed by RSCN (an NGO), with little funds allocations, RSCN faces a lot of obstacles enforcing hunting laws and other agricultural and environmental laws, mainly with little manpower and equipment.

- Recently RSCN managed to start a network with the Police to better laws enforcement mainly that touch nature conservation such as illegal hunting and wild species illegal trade. Alongside is the continuous cooperation with the Ministry of Agriculture which started long time ago, and aims to conserve the Forests and enforce the Agricultural law with its concern for hunting, grazing, wood cutting and wild plants collection.

- The environmental law no. 12 for the year 1995, and the reviewed Agricultural law in the years 1999-2000, represent a good step towards better law enforcement but still need to be implemented.

- The other main problem is manpower, currently RSCN is managing 5 reserves and helping to manage the sixth (Wadi Rum) with Aqaba regional authority. The total number of staff exceeds 140 individual, but still they are overloaded to cover the whole operation on site, and RSCN does not have enough financial resources to recruit more staff.

- The important problem is the completion of the protected areas network, which presents a major step towards having enough protested sites which resemble Jordan beautiful nature. The finance for such a project is a real important issue, RSCN is seeking to find donors for such project but still it needs a lot of time, effort and finance to reach to this stage.

- Mean while other types of problems for the suggested protected areas appear such as grazing in these sites, wood cutting, plant collection , hunting and other problems which have crucial effect on these sites, and does not find a suitable procedure for protecting and conserving until the declaration of the Protected Area.

- The public awareness towards Nature conservation still needs a lot to develop, RSCN managed to establish more than 1000 Nature club in schools, plus working to adjust the educational curriculums to better understand Nature conservation and environment issues. But still a lot of work needs to be done in order to increase the base for Public support for nature conservation and behavior.
- If we remember all the problems mentioned about the Wildlife reserves, the financial problem is the most important and the most crucial. Finding a solution will lead to better management for current reserves plus a great opportunity to complete the suggested reserves in the future and build the network among all reserves.

❖ **National and Recreational Parks:**

National Parks aim to conserve and protect cultural values of the sites, promote Sustainable tourism, and improve public awareness towards cultural and natural values. The area of the national park estimated of 10000 ha.

Currently, seven National Parks exist and are managed by the Ministry of Tourism and Antiquities, Local Authorities, Municipalities and Private sector, in addition to Dibbin National Park which was established in 1970s as a recreational Park and have recently been re-established as a Forest Reserve under direct management by the RSCN.

National and Recreational Parks:

| No | **National & Recreational Parks** | **Status** | **Year** |
|---|---|---|---|
| 1 | Petra National Authority | World Heritage Site | 1995 |
| 2 | Wadi Rum | Area of Special Restriction | 1996 |
| 3 | Aqaba marine reserve & Parks | Under establishment | 1995 |
| 4 | Wadi Al-Butum National Park | World Heritage Site | 1996 |
| 5 | Gammadan Municipal Park | Municipal and recreational | 1994 |
| 6 | Zai National Park | Recreational | 1970's |
| 7 | Mount Nebo National Park | Recreational and Archeological | 1996 |

❖ **Main problems facing National Parks:**

Currently, there are several National parks in Jordan (Petra National Park, Rum National Park…etc), these are managed effectively according to management plans which depend on scientific research, but if we consider recreational parks and Municipal parks, we will find a lot of problems.

- The problems are mainly that the sites are not managed according to proper zoning schemes or plan to minimize and control negative impacts from tourists and tourism.
- There are no clear scientific data for the sites and the old data were not updated through the whole past years.
- Another important problem is public awareness and support; these are not adequate nor clearly understood. A lot of efforts should be conducted to enhance these activities and gain a wider support for the near future.

❖ **Rangeland reserves**:

Rangeland reserves aim to manage and conserve vegetation cover of the sites by minimizing wood collection and grazing, managing watersheds and improve livestock quality and animal husbandry.

The number for these reserves reached to 34, and they are divided into 3 categories:

- Steppe Reserves
- Desert Reserves
- Highland Reserves

Rangeland reserves:

| No. | Reserve | Year of establishment | Area/Sq. Km. |
|---|---|---|---|
| 1 | Khanasry\Mafraq | 1946 | 4.5 |
| 2 | Sura\Mafraq | 1946 | 4.0 |
| 3 | Fujeij\Maan | 1958 | 10.0 |
| 4 | Duba'a\Amman | 1968 | 3.0 |
| 5 | Manshia/Maan | 1968 | 3.0 |
| 6 | Sabha\Mafraq | 1979 | 10.5 |
| 7 | Al-Lajun\Kerak | 1980 | 11.0 |
| 8 | South Mujib\Kerak | 1980 | 10.0 |

| | | | |
|---|---|---|---|
| 9 | Aishia\Maan | 1981 | 10.0 |
| 10 | Tuana\Tafiela | 1981 | 50.0 |
| 11 | Rajib\Ajlun | 1983 | 4.4 |
| 12 | Adassieh\Amman | 1983 | 20.0 |
| 13 | Ma'in\Madaba | 1983 | 83.3 |
| 14 | Ras Al-Naqab\Maan | 1986 | 12.0 |
| 15 | Wadi Al-Butum\Zerqa | 1986 | 15.0 |
| 16 | Eira & Yarqa\Salt | 1986 | 40.0 |
| 17 | Desert Azraq\Zerqa | 1987 | 300.0 |
| 18 | Nakhel\Kerak | 1987 | 9.0 |
| 19 | North Mujib\Madaba | 1989 | 10.0 |
| 20 | Desertification Control\Kerak | 1989 | 50.0 |
| 21 | Bilal\Amman | 1991 | 17.0 |
| 22 | Faisalieh\Madaba | 1992 | 20.0 |
| 23 | Mudawara\Maan | 1992 | 20.0 |
| 24 | Sarfa\Kerak | 1995 | 8.1 |
| 25 | Al- Bustanaih\Mafraq | 1996 | 10.0 |
| 26 | Al-Rugban\Zerqa | 1997 | 200.0 |
| 27 | Al-Kameeyah | 1997 | 10.0 |
| 28 | Um-Qsaier/Amman | 1997 | 2.2 |
| 29 | Al- Gasab and Al-Sateeh | 1998 | 15.0 |
| 30 | Manshiay Algheyath/Mafraq | 1998 | 50.0 |
| 31 | Al-Shareef/Kerak | 1999 | 50.0 |
| 32 | Husainyeh/ Maan | 2003 | 15.0 |
| 33 | Hashemya/Maan | 2003 | 15.0 |

| | | | |
|---|---|---|---|
| 34 | Fanoush/Jordan valley | 2008 | 50.0 |

❖ **Main problems facing rangeland reserves:**

- The management of these reserves is affected by several problems, the main ones are still financial and human resources, plus that the management style is not based on proper scientific data, boundaries definition, zoning plans and land use policies.
- The site-management at these reserves aims to protect and conserve the floral cover, not taking into consideration the human aspect, fauna and cultural issues. Only few reserves are working on sustainable development and watershed management within their sites.
- Although theses reserves are mainly concerned with the floral cover, the habitat status and economic values for the plants and other resources are still unclear and underestimated. If this issue changes in the future it will lead to better promotion to such sites, which in the end will create additional funds through tourism, and will cover the running costs for these sites.
- Some of the major threats to such reserves are the overgrazing, woodcutting, plant collection and illegal hunting, although the sites are declared as reserves. These threats resulted from poor legislation and laws enforcement on-site.
- As for scientific research and ecological data, they are done and gathered infrequently and inadequately, which resulted to non-existing inventory for the sites. The entire problem was mainly due to lack of human and funding resources which lead in the end to minimized research towards proper conservation, management policies and strategies.
- Overall, these reserves were not established based on international standards, nor national priorities, and are not considered as integrated ecological units with national and regional importance, although they maintain globally floral and faunal important species.

❖ **Marine reserves:**

❒ Marine reserves are still nourishing and developing, one reserve in Aqaba is established and being managed by the reserve management under the guidance and supervision by Commission of Environment of the Aqaba Special Economic Zone Authority (ASEZA). It lays in Aqaba cost for seven kilometers and divided to three zones in which each zone had its privacy; one is the marine research center where no activity is are allowed except scientific researches. Legal diving

and some health activities are allowed in zone two and three form the side of the sea to avoid stamping on the corals. There is a staff with two boats looking for the illegal coral collecting and diving but more rangers are needed to cover all the area.

**MAJOR ECOSYSTEM TYPES:**

Major ecosystem could be classified to main four **ecosystems** in Jordan that include global importance and uniqueness. They are the A- Desert Ecosystem B-Scarp and highland ecosystems C-Sub-tropical Ecosystem including Dead Sea Basin, the Jordan River, and the Gulf of Aqaba and the D-Freshwater ecosystems. The ecosystems could be also classified to several sub-ecosystems such as Agricultural ecosystems, Forests, Grasslands, Inland water bodies, Marine and coastal areas, Urban ecosystems, Landscapes, Arid, semiarid ecosystems and Mountain ecosystems

**A- Desert Ecosystem**

This type of ecosystem harbors three biogeography zones: Oriental, Saharo-Arabian and Afro-tropical. This area extends from the Northern-eastern part of Jordan down to Aqaba area on the Red Sea bordering Saudi Arabia. This ecosystem comprises the eastern three quarters of the country and is continues with the Arabian Desert of Syria, Iraq and Saudi Arabia. It is gently undulating plateau with an elevation of 500 to 900 m. four broad habitats -types can be distinguished in the ecosystem:

1. Hammada; smooth, gravel/chert plains, which stretches from Ras an Naqab to the Iraqi border in the north-east.
2. Harrat; black boulder-fields of basalt rocks, which extends from south Syria, through north-east Jordan, and onwards into Saudi Arabia.
3. Extensive sand dune desert that occurs in the southernmost part of the country such as Wadi Rum and Wadi Araba areas.

4. Clay pans lying at the bottom of closed drainage basins in the desert can become flooded after heavy rains, with the water persisting for several months rather than draining away. The best known such areas are Qa' al Azraq and Qa' Al Jafer , very occasionally forming a huge temporary lakes.

This largely treeless ecosystem is dominated on its fringe, adjoining the Highlands ecosystem by Irano Turanian species of small shrub and bush such as *Artemisia, Ratema, Anabasis* and *Ziziphus.* The majority of the ecosystem to the east of this highland fringe has even poorer plant cover dominated by *Artemisia, Phlomis, Stipa, Astragalus* and *Trigonella*. Deserts in Jordan are mainly defined as Badia.

The Badia is the main rangeland of Jordan, thus the range quality is deteriorating due to very heavy grazing and widespread of ploughing for cultivation of rain fed barely, which has led to loss of plant cover and accelerated soil erosion and degradation through wind and water erosion. This ecosystem includes Arid, semiarid ecosystems.

**B-Scarp and highland ecosystems**

This ecosystem consists of escarpment and mountains, hills and undulating plateaus which extend mainly from Irbid in the north to Ras an Naqab in the south, and from the Rift valley region in the west to the Badia region in the east.

The mountains in the southern half of its region are higher on average, and some range between 1,200 and 1,600 m high. Numerous broad, shallow, gravelly wadis drain the eastern and western flanks of this region. There is also an isolated tract of high mountains between Ras an Naqab and the Saudi border, including the highest peaks in Jordan Jabal Um Ishrin, at 1750 m.

Mediterranean woodland of pine and oak, with Juniper and cypress more locally is believed to have originally covered large tracts of the Jordanian highlands, but millennia of human occupation together with natural climatic change are though to have resulted in drastic deforestation and replacement of natural vegetation by secondary species. Woodland today covers about 100,000 ha in Jordan.

The largest remaining areas of natural woodland occur in the highlands between Amman and Irbid, and are dominated by *Pinus halepensis* above 700m, whilst mixed evergreen/deciduous oak woodland of *Quercus calliprinos* and *Q. ithaburensis* dominates at lower elevations where the original pine-dominated woodland has been degraded.

Cultivation of rain-fed wheat is widespread on the plateau between Madaba and Irbid, and olive groves cover a large part of the north-western mountains above 700m. More than 80% of the Kingdom's cities and villages occur within this region. This ecosystem includes Forests ecosystems, Grasslands, Urban ecosystems, Landscapes, and Mountain ecosystems.

**(b) Trends (i.e. changes in status);**

**(c) Main threats to biodiversity);**

As it is the case for the biodiversity of many areas in the Mediterranean region, the flora and fauna of Jordan particularly in scarp and highland ecosystems is facing a continuous deterioration because of one or several of the following factors:

- **Cultivation:** replacing natural vegetation cover with cultivated crops utilizing modern agriculture machinery.
- **Grazing:** the carrying capacity of many of the vegetated areas is way below the actual number of grazing animals mainly goats and sheep. In several areas, illegal grazing as well as overgrazing led to serious vegetation destruction, Goat grazing can seriously reduce plant growth and cause high seedling mortality.
- **Tree harvesting:** the forested and marginal areas are particularly stricken by tree harvesting for firewood and charcoal production. An estimated 1000 trees are lost annually most of which are old trees, which have a very

significant contribution to genetic diversity. The four most commonly harvested trees are*, Pinus, Quercus, Cupressus* and *Pistacia.*

- **Urbanization:** the spread of land usage for building houses, highways and roads as well as encroachment of people on public and state owned land gradually led to a decrease in forested areas. Jordan is facing a population boom which leads to an increasing demand for food and housing areas. Many cities, towns or villages have extended over their normal range and many agricultural zones are being shifted to residential zones.
- **Off-road driving:** trampling of vegetation in transitional and fragile ecosystems by off-road vehicles is leading to destruction of vegetation cover and soil erosion.
- **Plant collecting:** several plant species are threatened by unregulated collecting. These include medicinal and ornamental plant species of the genus *Tulipa, Narcissus, Lupinus, Retama* and *Cyclamen*. In Jordan, hundreds of specimens are illegally smuggled yearly in the form of either living or dry herbarium specimens. Many rare, endemic or new species to the flora of Jordan have been collected and taken to herbaria of various nations, especially European countries, without leaving duplicate specimens in Jordan or giving information about the place of their deposition or even a list of their names, numbers and locations.
- **Natural disasters:** Water stress, heavy rain, snow and flash flood rains are among the environmental factors that can lead to the destruction of plant species and to serious changes in the plant communities.
- **Pests and pathogens:** the effect of these biological factors is insignificant compared to other factors, as no epidemics were reported in Jordan for the past 50 years.
- **Pollution:** this factor is one with the least scientifically documented.. In certain areas, for example near the Cement factories or the petrol refinery in the Al-Hashemiah area, are permanent source of pollution, vegetation monitoring is of high priority. Other forms of pollution can exist and information needs to be gathered about them.

**C-Sub-tropical Ecosystem**

This ecosystem extends in the Rift Valley from Dier Alla area and down until Aqaba areas. It is so called sub-tropical due to the Sudanian penetration in this region. The Dead Sea rift follows the line of a gigantic fault which extends 370 Km from the meeting point of the Yarmouk river with the Jordan River in the north to the Gulf of Aqaba , and is part of the great African Rift Valley.

The northern part of the valley, defined by the drainage basin of the Dead Sea, is called Ghor. The southern part of the Valley, draining into the Gulf of Aqaba, is named Wadi Araba.

The country's main river, the Jordan, flows from north to south to the Dead Sea. The northern Ghor, lying north of the Dead Sea, The northern Ghor is the main agricultural area in Jordan; the principle crops are intensively cultivated fruit and

vegetables, irrigated from canals which divert water from the Yarmouk, Zarqa and other rivers. Wadi Araba is mainly composed of stony and gravelly outwash plains and mobile dune desert, with some sabkhas (saline mudflats).

The natural vegetation of the valley plain and lower scrap slopes has been greatly modified by cultivation and grazing in the Jordan Valley, but is more intact in the stonier Wadi Araba: Tropical Sudanian species of tree and dwarf-shrub are prominent in the sparse and very open vegetation, including *Accacia, Balantes, Tamarix, Calotropis, Maerua, Salvadora, Orhradenus* and *Panicum.*

Three ecozones in Jordan are of global importance: The Dead Sea Basin, the Jordan River and the Gulf of Aqaba.

- **Dead Sea Basin**

The Dead Sea is the lowest point on Earth, standing as low as -410m below sea level. The shores of the Dead Sea and the oasis in its vicinity preserve a rare blend of desert biota and biogeography relicts, which have survived in isolation of the surrounding desert. Several species have been separated from their species' gene pool long enough to evolve into subspecies, and even local endemic species. The presence of the latter is especially significant. It should be noted that the observed endemism and biogeography coexistence are biological rarities, confined to small biotopes that are easily disturbed.

One species of endemic fish and dragon fly (*Caloptryx syriaca*) are known to occur in the Dead Sea area. The Mujeb basin, where in relation to the Dead Sea, has been identified as an important bird and wetlands area for the Middle East. Here, evidence of breeding activity for the globally threatened Griffin vulture, lesser kestrel and the Egyptian vulture has recently been discovered.

Endemic birds are *Onychognathus tristrami*, *Passer moabiticus* and *Corvus rhioudo*. Many vertebrates such as the leopard, hyenas, Nubian ibex , rock hyrax , the jungle cat, Blanford fox, Egyptian mongoose, caracal and other globally and regionally endangered species inhabit the basin.

It should be noted that the observed endemism and biogeographic coexistence are biological rarities, confined to small biotopes that are easily disturbed. Nevertheless the Dead Sea basin has great economic revenue potential because of its cultural and biological diversity and resources if managed and conserved appropriately.

- **The Jordan River Basin**

The Jordan River and its tributaries flowing east west on its east bank are considered biologically important. As in the case of the Dead Sea, many endemic forms have evolved over the millennium to create many special habitats and communities. In dry and arid areas, wetlands become important ecosystems for the survival of species thus creating the chance for diversity of species and habitats.

The Jordan River is also an important wetlands area in the Middle East because it maintains many globally valuable species such as the brown fish owl, the common otter, Arabian leopard, rock hyrax, fresh water turtle, several endemic fresh water fish, fresh water snake and many other endangered species.

The river lies on a globally important migratory route for birds. It is estimated that about one billion birds migrate annually through this narrow corridor, thus making the basin an important migratory route of global avifauna, such as the black and white stork, dalmatian and common pelican, kingfisher, herons, shovlers, sandpipers, shanks, francolin and other globally threatened water fowl. In addition, the Jordan River represents a high economic value in terms of its forestry, agriculture, fishing, and religious and recreational tourism.

- **The Gulf of Aqaba**

The coastline of Jordan extends for 27 Km along the northeastern section of the Gulf of Aqaba, a long, narrow and very deep arm of the Red Sea. It consists of a series of embayments. In each, a comparatively similar and wide range of communities is present, including: rocky shore, reef flat, reef face, fore reef, sandy shore, sandy bottom and sea grass ecosystems. There is a discontinuous series of fringing coral reefs and reef flats, never more than 150 m wide, over a length of 13 Km. These are found mainly around headlands, and are separated by bays, usually sea-grass beds, which correspond to the mouth of dry wadis. The coastal plain is very limited, with alluvial fans spreading from inland mountains to the shore.

Being the only sea port of Jordan; so many anthropogenic activities have engulfed the short beach in the last 50 years. Currently, only 7 Km of the beach are still "natural", devoid of ports, hotels, residential constructions and factories. The Gulf of Aqaba's global importance stems from its geographical location. It is the only inland connection between Africa and Eurasia. It is still the bridge where many floral and faunal species are naturally transferred between east and west, north and south.

The Gulf of Aqaba hosts an extraordinary diversity of corals and related marine life despite a relatively small body of water. An estimated 50 percent of the Gulf's shoreline is fringed with coral reefs. Over 192 scleractinian (reef-building) coral species and 120 species of soft coral have been observed in the Gulf's waters. Within Jordan's Gulf waters, some 120 species of scleractinian coral and 10 species of soft coral have been noted. The gulf sustains about 250 different species of coral and other invertebrates, some of which are globally endangered, such as the red and black corals.

According to scientific accounts, tropical and semi-tropical fish observed in Gulf waters number 268 species. Other scientists stated that the marine environment maintains around 1000 marine fish, 5% of which are endemic. Many of these species, especially the migratory, are of high economic value, such as the tuna and sardine that enter the Red Sea and reach the Gulf of Aqaba, while most species find their habitats in reef or sea grass areas, pelagic fish species are commonly found in the

Gulf's open waters. Black tip, hammerhead and whale sharks have also been frequently observed. The marine resources of the gulf are of great economic value in terms of tourism, and the gulf itself, as Jordan's only outlet to the sea, is important for transport and industry.

**D-Freshwater ecosystems:**

- **Wetlands**

Apart from the famous Azraq Oasis ( Ramsar site) there is no major large wetland in Jordan, nevertheless there are smaller wetland areas that are important for the migrating or overwintering waterfowl. These occur in five main areas, which are : 1) North Jordan Valley 2) Middle Jordan Valley 3) South Jordan valley 4) Seasonal marshes and mud flats of the eastern desert such as Disi area, Qaa Khana, Burqu qaa ( permanent pond ) and Jafer. 5) Gulf of Aqaba.

Jordan lies on the major migrating route of north palearctic waterfowl. Although in the past few years the majority of migrating waterfowl has shifted from Azraq area to the Jordan Valley, due to the dryness of Azraq qaa caused by over extraction of underground water, migrating waterfowl nowadays disperse to different water bodies all over the Jordan Valley which gives it a crucial importance.

The hydrofaunal diversity of the above mentioned wetland areas are not thoroughly surveyed yet, certain floral and faunal key species are known up-to-date. Floral species such as *Phragmites communis*., *Juncus maritimus*. and *Nerium oleandor*, and faunal wetland species such as *Rana Ridibunda*, *Hyla arborea*, *lutra lutra. Tilapia spp.*, *Natrix tessellata*, *Barbus spp*., *Aphanius spp.*, *Gara rufa*, *Claris lazera* and many reptiles are known to inhabit these areas.

Jordan's wetlands vary from salt marshes to marine ecotypes to estuaries and permanent small water bodies to man-made water reservoirs and sewage treatment plants. Any water body in such semi arid areas is of significant importance for the survival of migrating waterfowl. However, all water bodies in Jordan are looked upon as a source of exploitation for urban, agricultural or industrial uses. Many water bodies are affected by increasing salinity, pollution and eutrophication due to intensive agricultural practices. Many aquatic species are at the edge of extinction if not already so. Seasonal marshes in Disi and Jafr areas are deteriorating due to seasonal cultivation of barely and wheat.

The above mentioned areas are also divided into different wetland types varying from man made water reservoirs to natural small ponds and permanent or seasonal springs in wadis.

**Inland water bodies**

**(a) Status of biodiversity in water bodies;**

Wetland types found in Jordan include salt marshes, coastal, estuaries, permanent small water bodies, man-made water reservoirs and sewage treatment plants. Any water body in such semi arid areas is of significant importance for the survival of

migrating waterfowl. However, all water bodies in Jordan are looked upon as a source of exploitation for urban, agricultural or industrial uses. Many water bodies are affected by increasing salinity, pollution and eutrophication due to intensive agricultural practices. Many aquatic species are at the edge of extinction if not already so. Seasonal marshes in Disi and Jafr areas are deteriorating due to seasonal cultivation of barely and wheat. The above mentioned areas are also divided into different wetland types varying from man made water reservoirs to natural small ponds and permanent or seasonal springs in wadies.

Apart from the famous Azraq Oasis (Ramsar site), there are no major large wetlands in Jordan. Nevertheless, there are smaller wetland areas that are important for the migrating or over wintering waterfowl. These occur in five main areas, which are: 1) North Jordan Valley, 2) Middle Jordan Valley, 3) South Jordan Valley, 4) Seasonal marshes and mud flats of the eastern desert such as Disi area, Qaa Khana, Burqu qaa (permanent pond) and Jafer, and 5) Gulf of Aqaba.

The following sections present the status of Jordan wetlands.

**1) North Jordan Valley**

**Yarmouk River basin including Arais Pool.** A steep -sided valley running along the Jordan - Syrian border within the north Jordan Valley (32 44' N 35 44' E) extending over an area of about 3,000 ha. The river banks are characterized by *Phragmites communis*, *Nerium oleander*, *Juncus maritimus* and other plants typical of wetlands and river areas in the Middle East. Typical bird species are *Ketupa zeylonensis* (rare) , *Fulica atra* (breeding), *Gallinula chloropus*, *Anas crecca*, *Ardea cinerea* , *Ardea purpurea*, *Bubulcus ibis*, *Vanellus vanellus*, *Alcedo atthis*, *Larus ridibundus*, *L. melanchocephalus*, *Gallinago gallinago, Tringa totanus, T. nebularia,* and *Actitis hypoleucos*. The *Lutra lutra, Felis chaus*, *Procavia capensis*, *Tillapia spp.*, *Rana ridibunda* are some other species reputed to inhabit the area. Occasional hunting occurs. There is intensive cultivation of fruits and vegetables in the North Jordan Valley.

**Wadi El Arab.** This wadi is located within the north Jordan Valley area (32 35 N 35 40 E) extending over an area of about 267 km². The area is inhabited by marsh plants such as *Phragmites communis, Nerium oleander, Tamarix aphylla*. Waterfowl known to occur are: *Fulica atra , Anas crecca, Bubulcus ibis, Egretta garzetta, Ceryle rudis, Alcedo atthis, Halcyon smyrnensis, Larus ridibundus, Ardea cinerea, Egretta alba, Tringa stagnatilis, T. nebularia, T. totanus* and others. *Rana ridibunda, Tillapia zilli, Claris lazera* are also part of its hydrofauna. A dam was constructed on wadi El Arab in 1987, with a total capacity of 20 MCM to collect flood water and base flows for use in irrigation in the Jordan Valley area .Since its completion the dam was filled by waters originating within its catchment only in the very wet year of 1991/1992. In the other years, water was pumped from King Abdallah Canal during floods to increase the stored amount of water in the dam for use during the dry season. The

catchment area is under agriculture, but Irbid city is expanding westward into the catchment which may put increasing pressure on the quality of the water collected in the dam.

**Wadi Ziglab.** The wadi basin is inhabited mainly by plant species typical of semi arid conditions such as *Nerium oleander*, *Phragmites communis*, *Retama reatam*, and *Tamarix aphylla*. Typical fauna includes *Rana ridibunda, Hyla arborea*, *Agama spp.*, *Geko spp*, *Alectoris chukar*. Visiting waterfowl recorded include *Ardea cinarea*, *Nyctricorax nyctricorax*, *Ixobrychus minutus*, *Egretta garzetta* and others. Various springs issue along the Wadi Ziglab with a total discharge of some 5 MCM/ year. In addition, Wadi Ziglab drains another 5MCM/year of floodwater. A dam was constructed in Wadi Ziglab with a total capacity of 4.3 MCM in 1966 and an aim of using its water for irrigation in the Jordan Valley area. The catchment area is agrarian with natural forests and very little population. Therefore, the water collected in the dam is of high quality and can be used for different purposes.

**2) Middle Jordan Valley**

**Zerqa River basin ( King Talal Dam, Khirbet Al-samra ).** The main important areas for waterfowl within the Zerqa Basin are respectively King Talal Dam (KTD) and Khirbet Al- Samra Sewage plant treatment station, both of which are visited by migrating waterfowl such as *Ardea cinerea* (Breeds), *Egretta garzetta*, *Bubulcus ibis*, *Ixobrychus minutus*, *Fulica atra, Anas crecca, Anas platyrhynchos, Alcedo atthis* (Breeds)*, Tringa ochropus*, *Vanellus spinosus,* and *Ciconia ciconia*. The area of KTD is famous for sustaining big stocks of fish, indigenous and introduced species, *Tilapia spp*, *Claris lazera*, *Noemacheilus damascena*, and *Aphanius spp*. Adjacent to the dam still exists natural pine forests where the Persian red squirrel still inhabits the area. In 1987, the river otter *Lutra lutra* was recorded in one of the streams near Zerqa River. Unfortunately both sites are among the most contaminated in Jordan due to the poor capacity planning of the sewage plant and lack of control of inputs.

**Wadi Damia, Kibed Pool, Kafrain Dam, Shuneih Dam, Swaimeh-Pool.** Vegetation becomes less common and scarce in the middle Jordan Valley areas due to the site elevation (200 ASL). The dominant vegetation cover is phragmites and Tamarix. Some areas are inhabited by *Populus euphratica*. The main water bodies are inhabited by many crustaceans such as *Gammarus spp, Crabs, Barbus canis, Barbus longiceps, Gara rufa, Tilapia spp,* and *Aphanius spp*. Observed waterfowl are: *Gallinula chloropus* (Breeds), *Rallus aquaticus, Prozana prozana, Himantopus himantopus* (Breeds), *Recurvirostra avosetta, Calidris minuta, Caladris alpina, Ardea goliath, Tadorna tadorna, T. ferruginea, Pluvialis squatorola, Anas penelope, Tringa hypoleucos, Tringa nebularia, Ardea cinarea* (Breeds), *Egretta garzetta, Nycticorax nycticorax, Vanellus vanellus, Vanellus spinosa,Tringa ochropus, Ceryle rudis* (Breeds), *Halcyon smyrnensis* (Breeds), *Acrocephalus scripaceus* (Breeds), *Charadrius dubius, Francolinus francolinus, Anas crecca, Anas querquedule, Larus ridibundus, Alcedo atthis* (Breeds), *Ciconia ciconia, Fulica atra, Bubulcus ibis, and Chlidonias leucopterus*. All sites mentioned above are surrounded by cultivated land and are

exposed to over- pumping, pollution, hunting and unplanned urban expansion. Kibed Pool is distinguished with high water salinity.

**3) South Jordan Valley**

**Wadi Mujeb.** Elevation ranges from 1,100m ASL to 400m BSL. The rocks forming the catchments area consist of fractured limestone, dolomites, shales, sandstone and shert beds. The wadi is inhabited by beds of *Phragmites spp*, *Juncus maritimus* and scattered *Phoenix dactylifera*. Main indigenous animals are: *Barbus spp.*, *Capoeta damascena*, *Gara spp.*, *Hemiggrammacopoeta nana*, *Aphanius spp.*, Crabs, *Rana ridibunda*, *Hyla arborea, Agama spp.*, *Capra ibex nubiana*, *Procavia capensis*, *Caracal caracal lynx*, *Canis lupus*, *Vulpes vulpes*, *Hystrix indica.* The waterfowl observed include *Ciconia ciconia*, which occurs in large numbers during migration season, *Ardea cinerea, Charadrius hiaticula, Egretta garzetta, Himantopus himantopus, Haemtopus ostralegus, Phoenicopterus ruber, Ciconia nigra, Platalea leucorodia, Plegadis falcinellus* and *Bubulcus ibis*. Wadi Mujeb is vulnerable to the effect of over-pumping and increasing salinity. Recently (1993) pumping projects have started on some of its main streams. A highway is being built nowadays which will link Middle Jordan Valley with Aqaba, and this will create additional pressure on the Avifauna of the area.

**Seasonal Marshes and Wadis in the Eastern Desert**

- **Burqu.** Natural pond, with Hammada ecotype with scattered populations of *Artemisia spp.*, *Anabasis spp.*, *Gazella spp.*, *Canis lupus*, and *Vulpes vulpes*. Very little information is available on the birds that occur at the pond at migrating periods. However, it was reputed that *Anas spp*, *Ciconia ciconia, Circus aeruginosus* were observed there. A survey for the area is proposed by RSCN to assess the suitability of Burqu as a potential Biosphere Reserve for Jordan.
- **Qa'a Khana.** Seasonal salty marches and mud flats with very few plant communities consisting mainly of halophytes. In some wadis scattered beds of *Phragmites communis* and *Juncus maritimus*, *Tamarix jordanis* and *Retama raetam* exist. Very soon after the rain the mud flats are filled with halophilic crustaceans such as *Cyclops spp.*, *Triops Canserformes*, and *Daphnia spp.*, most probably transferred by waterfowl. Migrating birds observed include: *Tadorna tadorna, Anas crecca, A. querquedula, A. acuta, A. clypeata, Aythya fuligula, Charadrius alexandrinus, Vanellus vanellus, V. spinosa, Tringa nebularia, Philomachus pugnax, Ardea purpurea, Ciconia ciconia,* and *Grus grus.*
- **Qa'a Jafr.** Mainly saline seasonal marshes which attract waterfowl. Very little is known about its fauna and flora. Some observations of birds were recorded lately and these include: *Bubulcus ibis*, *Himanopus himantopus*, *Anas acuta*, *Charadrius leschenaultii*, *Charadrius dubius*, *Charadrius alexxandrinus* (Breeds), *Caladris alpina*, *Tringa hypoleucos*, *T. ochropus*, and *Calidris minuta*. Due to over-pumping from the basin, water salinity has increased. Very little cultivation is practiced.
- **Qa'a Disi.** Disi is a rich fossil water aquifer which has lately been extracted heavily for agricultural irrigation and urban consumption. The Qa'a consists of

salty mud flats filled from rain water in good seasons. Those attract waterfowl such as *Bubulcus ibis*, *Himantopus*, *Tringa nebularia*, *T. hypoleucos*, *T. ochropus*, *Vanellus spinosus*.

- **Azraq Oasis.** Azraq Oasis; is one of very few such sites in the Saharo-Arabian region and it is recognized locally, nationally and internationally as an important wetland. Such recognition is primarily based on the site ecological, physical, hydrological, historical, cultural, and recreational characteristics. The ecological characteristics of the oasis were found to fulfill the criteria of many internationally reputable organizations, conventions and programs including The United Nations' List of Biologically Interesting Places (1962); the Convention on Wetlands of International Importance (often known as Ramsar Convention following the place of adopting it in Iran in 1971); the Criteria of the Birdlife International Important Bird Areas; and the criteria of the Global Raptor Watch (GRWS) Sites. Azraq is the only Jordanian wetland recognized internationally as a Ramsar site (a wetland site designated under the Convention on Wetlands as internationally significant based on a variety of criteria including ecological, biological and hydrological functions and values). Jordan became a Contracting Party to the Ramsar convention in 1976, where Azraq was declared as the first, and yet the only Ramsar site in 1977. The recognition of Azraq Oasis by the above mentioned international conventions and programs perform a major role in promoting wise use and adequate conservation of such sensitive ecosystem.The Ramsar convention came into force for Jordan in May 10, 1977. Currently, Azraq is the only site designated as a Wetland of International Importance, with a surface area of 73.72 km².

Although the wildlife diversity of the above-mentioned wetland areas is not thoroughly surveyed yet, the occurrence of certain plant and animal key species has been documented. Plant species such as *Phragmites communis*, *Juncus maritimus,* and *Nerium oleander,* and wetland fauna species such as *Rana ridibunda, Hyla arborea, Lutra lutra, Tilapia spp., Natrix tessellata, Barbus spp., Aphanius spp., Gara rufa,* and *Claris lazera* are known to inhabit these areas.

**(b) Trends (i.e. changes in status);**

In the worst development case the pollution load from agriculture and waste water increases a lot and this means heavy eutrophication and salinity pressure. According to a "good" development scenario the agriculture remains miserable, approximately at the level of 2000. Both cases assumed that enterprises follow the rules for environmentally friendly manure handling. The "good" scenario would lower the pollution and salinity to water bodies a lot but not so with Nitrogen load, the worst scenario would keep the existing pollution load but increase the N load.

**(c) Main threats to biodiversity);**

- Wetlands are facing several environmental challenges with respect to their ecological features, and their physical values and functions. Azraq Oasis as example was not away from facing such challenges, where up to date developments within the Azraq basin, including the over pumping of the ground

water, wetland conservation and management programs, in addition to other human activities that posed tangible changes in the district and in status of this unique ecosystem.

- As a result of these challenges the oasis lost a significant portion of its ecological characteristics for which it is recognized as an internationally important wetland.
- The importance of the inland water bodies in fisheries has dropped much, due to pollution, this endangers traditional lifestyle of local people
- Wetlands in Jordan are subject to deleterious ecological changes due to several environmental challenges they witness, having the water scarcity challenge and the ever increasing demand on water as the most important. The impacts are not yet quantitatively assessed, however; these impacts include:
  - ✓ Changes in wetland area
  - ✓ Changes in water regime
  - ✓ Changes in water quality
  - ✓ Changes in wetland products exploitation
  - ✓ Introduction of alien species
  - ✓ Management, neglect and restoration
  - ✓ Impacts on the local and national socio-economic conditions

**(d) Implications of changes on human well-being.**

A few cases are known in Jordan where fish have contaminated because of pollution, increasing salinity that resulted in low crop production, affected the existence of many species, and reducing the eco-tourism value. Algae appeared in small lakes and pools, and contamination of drinking water. The highly eutrophic water bodies will affect the biodiversity negatively.

❖ **Agricultural ecosystems:**

**(a) Status of biodiversity in agricultural systems of Jordan;**

- During the period 1975-1997, the land area available for rainfed agriculture progressively decreased due to the irrational and (in most cases) unjustified expansion of the boundaries of municipal and village councils.
- o There was an increase in the area planted with fruit trees. The largest increase was in the area planted with olives, especially under irrigation and in small holdings in the rain-fed areas, in which planting of field crops was no longer economically justified.
- o There has been a continuous and tangible decrease in areas planted with grain legumes.
- o Areas planted with wheat and barley fluctuated from year to year. There was however, a clear trend of a decline in the area planted with wheat and an increase in the area planted with barley, especially in marginal areas, not suitable for cereal production.

- The area cultivated with vegetables significantly increased due to increased irrigated areas outside the JV. The area cultivated with vegetables in rainfed areas, although small, continued to decrease.
- The area of rainfed land left uncultivated increased due to many factors, including the small size of holdings, land fragmentation and low revenue expected from field crops cultivation, and increase the areas of fallow-land. The average area of rainfed land left uncultivated including, fallow-land, is estimated at one million du annually.
- The irrigated area continued to increase, and advanced irrigation methods in both vegetables and fruit tree production was introduced.
- There has been a tangible effort deployed by farmers to reclaim rocky lands in the high rainfall areas for planting fruit trees.

➢ The growing of traditional cultures is decreasing. The portion of organic farming is slowly increasing, though still small the trend is favorable.

➢ Several local breeds and varieties have become rare and some of them are listed as threatened, such as Jordanian native cattle breed, native Arabic horse, native chicken and Syrian donkey. The same list includes also Jordanian tomato, cucumber, squash, wheat, lentils, and barley.

**(b) Trends (i.e. changes in status);**

❒ Out of a total 0.39 million ha of agricultural land, about 0.17 million ha are located within municipal boundaries, most of which are in danger of being converted to non-agricultural uses.

❒ Land available for cultivation decreased from about 0.39 million ha in 1975, to 0.306 million ha in 2000. Between 1975 and 2000 around 88.4 thousand ha were no longer available for agriculture. Although there was a noticeable increase in the irrigated area, the rainfed agriculture has suffered from the loss of large areas of the best land, especially in areas bordering the municipal and village councils.

❒ Changes in land use are very important that happened by the following reasons:

➢ Continuous decline in the area of productive agricultural land, due to the encroachment of urban activities on agricultural lands,

➢ The fragmentation of agricultural land, converting larger parcels into small production units unsuitable for mechanized agriculture.

➢ The fluctuation of rainfall from one season to another, and its irregular seasonal distribution.

➢ A continuous decline in the quantity of fresh water available for agriculture, and the continued deterioration of its quality due to the increased rate of its mixing with treated wastewater of high salinity.

➢ Groundwater depletion resulting from over pumping.

➢ Continued encroachment on forestland through uncontrolled grazing, illegal tree cutting, and using forestlands for government and civil uses.

➢ Shortage in rehabilitation and social care programs for the agricultural labor,

❒ The intensively managed lands are concentrated in Jordan Valley and irrigated land in the high land areas. The partial organic farming in 1990-ies due to economic reasons is largely turning back towards more intensive management.

- ❒ The agricultural land is decreasing and being replaced with dwelling areas in particular around larger cities.
- ❒ The conservation plan for the native land races of cereal and field crops is doing well at the same time the situation with the native chicken, cows and buffalo is hopeless.

**(c) Main threats to biodiversity;**

- ➢ High cost of agriculture inputs, shortage of water resources and weak marketing affecting negatively on agricultural production that increased using of chemicals and pesticides to overcome the low production and low income.
- ➢ Urbanization of arable land.
- ➢ Extinction of certain breeds is happening due to changes in the economic reasons that created these breeds and the changes in their socio-economic role.
- ➢ Globalization of agriculture and high competition with other countries cause reduction of export to neighboring countries particularly Arab Gulf countries. This obliged the farmers to use imported seeds, chicken and cattle's.
- ➢ Due to lack of arable land farmers cultivate the arid zones and eliminate the wild plants and deteriorate the natural habitat in arid and semiarid areas.

**(d) Implications of changes on human well-being.**

- ✓ People have not realized the role of rural lifestyle and changing landscape in culture,
- ✓ Attitude is largely influenced by urbanization and high price of lands..
- ✓ Changes in agriculture are related to landscape diversity.

❖ **Forests**

**(a) Status of biodiversity in Jordanian forests;**

- ❒ Jordan has limited areas of natural and manmade forests, covering only 1% of the country's total area. In 2008 the area of natural forest, was 43100 ha. of which, 38100 ha. is government forests, and 5000 ha. privately owned forests. The area of manmade forests is 42000 ha.
- ❒ Despite the important role of forests in bio-diversity conservation, preventing soil erosion, recharging aquifers', and maintaining an environmental balance, this resource has not been treated as an important natural resource. Thus its contribution has been confined to providing firewood and contribution to local tourism.
- ❒ Some forest areas serve as touristic and entertainment sites that can be expanded and developed for future environmental tourism.

- ❒ Natural and artificial forests, comprising 38,100 hectares of government owned forests and 5,000 hectares of private forests. They are of the following types:

- Evergreen broadleaf forests of a 26,000 hectare area. Main element is *Quercus coccifera* trees in the north and south.
- Deciduous broadleaf forests of a 4,000 hectare area. Main element is *Quercus aegilops* in the north.

- Conifer forests covering 10,000 hectares, with *Pinus halepensis* in the north and *Junipers phoenician* in the south.
- Mixed forests covering 3,000 hectares, with *Pinus halepensi* and *Quercus coccifers* in the north.
- *Olea eyropea* forests covering 100 hectares in the Burma area around Jerash.

❒ Artificial forests with an area of almost 42,000 hectares are found in shallow soil on slopes which vary between a 15-50% incline levels. They are 500-1200 m above sea level.

**(b) Trends (i.e. changes in status);**

- ✓ The role of voluntary protection is growing among environmental societies and media.
- ✓ Protection of the elements of biodiversity in managed forests is granted by law.
- ✓ It is possible that climate change has some negative impact on the species composition of the forests particularly the *Juniperus* .
- ✓ The role of Forestry Department is growing but the challenges also growing specially the cutting of trees for fuel wood and weak budget for afforestation.
- ✓ Areas covered with forest trees did not substantially increase despite continued efforts during several decades to plant forest lands. This was due to the continued encroachment on forests by farmers, or for construction purposes by governmental institutions, despite the availability of strong legislations for the protection of forests.
- ✓ The use of some private forests land has changed to fruit-tree cultivation without taking the necessary measures to protect the soil, which has contributed to a higher rate of soil erosion, soil deterioration, and to finally losing these areas as forests or productive lands.
- ✓ There has been increased interest in establishing reserves to protect forests and the forest ecosystem, resulting from global interest in biodiversity conservation. These reserves serve as a natural plant gene-bank, especially wild plants with potential medicinal uses and endangered species of plants, animals and birds. The number of established reserves forest reached six.

**(c) Main threats to biodiversity;**

- ➢ **Tree harvesting:** the forested and marginal areas are particularly stricken by tree harvesting for firewood and charcoal production. An estimated 10000 trees are lost annually most of which are old trees, which have a very significant contribution to genetic diversity. The four most commonly harvested trees are*, Pinus, Quercus, Cupressus* and *Pistacia.*
- ➢ **Urbanization:** the spread of land usage for building houses, highways and roads as well as encroachment of people on public and state owned land gradually led to a decrease in forested areas.
- ➢ **Forest fire:** more than 100 fires happened annually that resulted of 20000 trees loss in addition to

- **Picnics**: State forests provide recreational possibilities for people but this causes collecting of wild flowers, fires, and damage the vegetation cover.
- **Grazing:** In several forest areas, illegal grazing as well as overgrazing led to serious vegetation destruction, Goat grazing can seriously reduce plant growth and cause high seedling mortality.
- **Natural disasters:** Water stress, snow and flash flood rains are among the environmental factors that can lead to the destruction of plant species and to serious changes in the plant communities.
- **Pests and pathogens:** the effect of these biological factors is insignificant compared to other factors, as no serious epidemics were reported in Jordan for the past 50 years.
- **Pollution:** this factor is one with the least scientifically documented.. In certain areas, for example near the Cement factories or the petrol refinery and other factories around Zerqa basin, are permanent source of pollution, vegetation monitoring is of high priority.

**(d) Implications of changes on human well-being.**

- ✓ Climate change may increase the number of alien species,
- ✓ Change communities and disturb habitats.
- ✓ The deforestation may cause flooding, soil erosion, and biodiversity loss.

❖ **Arid, semiarid ecosystems (including Grasslands and Range lands)**

**(a) Status of biodiversity of grasslands;**

Rangelands, defined as the areas receiving less than 200 mm of average annual precipitation, cover more than 90% of the total land area of Jordan. The present condition of rangelands in Jordan is generally poor to very poor. They urgently need demarcation, re-organization, management plans, strategies and action programs for their proper scientific management. Grazing is the optimal way of utilizing these areas, of converting native plants not usable by man to animal products suitable for human consumption. In most cases, present production does not exceed one-third to one-sixth of the potential productivity. The cause of this low productivity is overgrazing of the rangelands, resulting from a higher demand for animal products by a fast increasing population. Overgrazing inhibits several plant species from producing enough seeds to maintain suitable vegetation cover. Consequently, several important species have disappeared, and less palatable species have dominated and taken their place.

**(b) Trends (i.e. changes in status);**

- The poor management of rangelands, the destruction of plant covers, weakening of productive capacities of rangelands.
- The deterioration of the rangeland's natural vegetation due to overgrazing.
- Several important species have disappeared, and less palatable species have dominated and taken their place.

**(c) Main threats to biodiversity;**

- Overgrazing and early grazing.
- Cultivation of field crops instead of wild plants.
- Uprooting of range plants to be used for fuel wood.
- Haphazard movement of vehicles.
- Urbanization on rangeland.
- Ignoring traditional grazing rights.

**(d) Implications of changes on human well-being.**

**Marine and coastal areas**

**(a) Status of biodiversity in marine areas and coast;**

Coastline of Aqaba Gulf covers 27 km on the Red Sea; from the most northern tip of the gulf of Aqaba, which extends for about 180 km from the Jordanian shore in the north to the sills of the Strait of Tiran in the south. It has an average width of 20km and an average depth of 800m. Coastal sea is an extremely important habitat supporting biodiversity. The diversity of coast types is high and they are very much represented among protected areas. The biggest changes have occurred in coastal areas with industrial use, port activities, wastewater and traditional human impact; the landscapes are valued as traditional. The number and growth of marine species are decreased with pollution. The vegetation is poor in species richness.

Aqaba marine coastal management project was started in 1995 in cooperation with the Aqaba Region Authority, Global Environmental Facility and the EU. Main objectives of the project: To promote conservation of the marine biodiversity, establish a coastal management plan as well as build up environmental capacity of the Aqaba Regional Authority. Outputs of the project have resulted in the creation of the first Marine Reserve, a Coastal Management Master Plan for the Aqaba Coast and the establishment of an Environmental Unit at the Aqaba Regional Authority.

**(b) Trends (i.e. changes in status);**

The situation in the Aqaba Gulf has been changing rapidly as intense commercial and industrial development takes place along the coast.

The sea gets poorer, more polluted and eutrophic, introduced species are spread. The state of eutrophication in the sea has to be improved.

Wide coastal areas are developed into summer house areas, increasing human impact.

Limited fish stock and catch limits affect among also traditional activities of people.

**(c) Main threats to biodiversity;**

- The development of shipping, industry and urban centers along the coast threatens to degrade significantly the environment in which these ecosystems thrive.

- Although the first marine reserve was established and started to have some conservation activities in Aqaba, the reserve still needs to finalize the

management plan and the capacity building needed for the staff and the locals for such activities.

- Legislation here plays a main problem because the laws are not clear yet nor enforced enough for better coastal conservation especially with the presence of the coral reefs.

- Another important problem is public awareness and support; these are not adequate nor clearly understood. A lot of efforts should be conducted to enhance these activities and gain a wider support for the near future.

- The insufficient base line information available concerning marine life is due to financial situation, and weak involvement of legislative authorities, which creates a deficiency in information needed to support appropriate management.
- Eutrophication due to high nutrient loads and pollution.
- Real estate development pressure in coastal areas, increasing human pressure.
- Increasing tourism load and sensitive coasts.
- As the main source for nutrients are sewage water, agriculture, and port activities, prevention of nutrient loads from pollution to coastal sea is the main factor to protect coastal sea.
- Pollution caused by oil spills and other human activities.
- Over-fishing of high value marine and coastal resource.
- Destruction of coral reefs and shallow water habitat.
- Inadequate information on fish stocks.
- By-catch of non targeted or protected species.
- Use of illegal fishing gears and fishing out of season.
- Introduction of alien fish species.

**(d) Implications of changes on human well-being.**

The limits to fishing affect directly economy and welfare, blooming of the blue-green algae disturbs and sometimes directly threatens welfare of local people, tourist and coral reef. A few cases are known, where coral have damaged because of algal blooms, pollution and human impact.

**Urban ecosystems**

**(a) Status of biodiversity;**

With the introduction of modern infrastructure, roads, and services into the countryside during the 1950's and 1960's, villages have increased in numbers. In fact, the majority of currently ingested villages are those built in this period, several villages became officially planned according to zoning regulations. A comprehensive land use scheme is lacking on the national, regional and local levels. As a prerequisite for nearly all decisions, e. g., in the water sector for the location and design of waste water treatment facilities, in the transportation sector for design and construction of roads, for agriculture, industrial facilitates, mining, and the protection of nature

reserves, lack of land use planning creates serious threats for the environment as well as for public health. Examples of problems caused by deficiency of land use planning are the City of Amman's westward expansion that has encroached on some of Jordan's finest agricultural land while the eastern sites receive less attention. 80% of urban areas exist in agriculture land.

The key issues in the urban areas are:

- The expansion of urban development was at the expense of cultivable land and natural habitats,
- Lack of effective land use planning,
- High growth rate of population and unsuitable consumption patterns.
- Litter and waste generated as a result of high consumption levels and bad management.

**(b) Trends (i.e. changes in status);**

- Fast growth of dwelling areas, in particular around Amman, Zerqa, Aqaba and Irbid cities will continue, that will reduce the agricultural land and related decrease of land use diversity.
- Urban environmental problems tend to be increasing in Jordan and may become a predominant obstacle to environmental sustainability.

**(c) Main threats to biodiversity;**

- Unacceptable interaction between major industries and urban areas has occurred because of the lack of proper urban planning.
- Industries are concentrated in and around urban areas especially in Amman, Zarqa and Aqaba. The absence of mass transit system leads to degradation of air quality due to vehicular emissions, especially in Downtown Amman.
- The coherence of ecological network changes, adapted to widening dwelling areas biota is less diverse than that in natural ecosystems.
- Problems occurred from disposing of liquid and solid waste in urban areas.
- Three main environmental issues related to the land use for urban were identified: land degradation, land contamination and coastal zone degradation.

**(d) Implications of changes on human well-being.**

The relations are not acknowledged; important is the relation to landscape diversity and decrease of arable land. Widening of dwelling areas causes landscape fragmentation at the same time making it more homogenous – repeated patches of the same structure arise.

❖ **Public awareness and data sources:**

✓ Currently 18 NGO's work directly & indirectly to raise awareness on environment & biodiversity conservation especially RSCN which is the largest

NGO body in Jordan, established in 1966, and the Jordan Environment Society (JES), established in 1986, Royal Society for Ecological Diving, Jordanian Society for Desertification Control & Badia Development and others.

- ✓ Public awareness activities where in form of training workshops and activities on local community level on reserve conservation especially by RSCN, JES on agro-biodiversity, extension activities on range and forestry areas targeting farmers, women and students. Media sector where focused also on environment protection, natural resources conservation. Other activities included field tours and visits to tourism, recreational and other natural areas.

- ✓ Several national governmental and non-governmental organization (NGO's) implemented public awareness programs on environment protection especially on pollution prevention, nature conservation, wildlife and others. There were many activities on national level done directly & indirectly on biodiversity conservation. The most appear efforts were by the Ministry of Agriculture on forestry conservation and the Royal Society for Nature Conservation (RSCN) on wild life and nature conservation.

- ✓ Many projects, NGO's, Ministries, universities, schools and mass media are contributing in these efforts, more than 1000 workshops, seminars, meetings, training courses are conducted annually in the field of biodiversity conservation, sustainable uses, and different field of environment. The awareness and training programs are focused on the target groups of the general public and students in various education phases.
- ✓ The aim of this activity is to bring simplified information for the public and state-of-the-art knowledge to students about the three conventions and themes, with special focus of the new concepts and approaches developed by the scientific bodies of the conventions, and to transfer the quality knowledge resulting from the Conventions, tailored to the Jordanian conditions to the general public and students in a variety of suitable awareness and education tools.
- ✓ This activity mostly implemented by certain organization alone or by a coalition of few organizations like Ministry of Agriculture, Ministry of Education, Ministry of Environment (Focal point of the conventions), Ministry of Higher Education (responsible for planning the modification of university courses), NGO's (RSCN, Jordan Environment Society, etc) who has an excellent record in environmental awareness activities and universities that could take the lead in introducing the concepts of the three conventions in its curriculum and be committed. The awareness program mainly acted on the three issues of biodiversity, climate change and desertification in addition to other several fields such as organic farming, water harvesting, home gardens and pollution control.
- ✓ Communication and data sources varies according to education level, means for dissemination of information showed that more than one mean is used; including workshops, lectures, meetings, a newsletters, emails, journals and newspapers, internet, or a combination of all the means.

- ✓ Objectives:
- To increase the level of public awareness of the conventions and the associated themes, with special focus on new concepts.
- To enhance the school curricula with new concepts in the three conventions.
- To develop a higher education package of courses related to biodiversity, climate change and desertification.
- Outcomes:
- More awareness in the general public about the conventions and the themes of biodiversity, desertification and climate change.
- School curricula enhanced with new concepts.
- New university courses developed for biodiversity, desertification, climate change and their linkages.
- Few thousands of pamphlets, films, publications and posters are distributed annually.

➢ Obstacles of Public Awareness Programs:

✓ Public awareness programs are lack of necessary attention from governmental and academic organization. No scientific studies done on public awareness on biodiversity. They lack also from necessary administrative, technical & required funding as well as trained human resources.

✓ Public awareness programs faced obstacles on the local community level. People lack of awareness on environment protection & biodiversity importance. They have little information about the value of biodiversity and the threats on natural resources due to environmental pressures, for examples grazing, trees cutting, urban extension, pollution, … etc.

✓ Lack of coordination on the national level. The Sustainable Development Networking program is expected to improve this coordination.

✓ It is not easy to convince the local communities to conserve the natural resources due to weakness in legislation and polices. Examples are the absences of land use planning law, no effective law for pollution prevention. In addition, if the awareness program conveys messages affects local community living, an additional subsidy should supply.

# Chapter II
# Current Status of National Biodiversity Strategies and Action Plans

**Introduction**

Environmental planning and policy formulation in Jordan prior to the 1990s was based on a sector-specific approach with little consideration of environmental concerns. It can be said that environmental planning and policy formulation came to age in 1991 when the National Environmental Strategy (NES) was formulated by a national consultation process led by the Ministry of Municipal, Rural Affairs and the Environment with technical assistance from IUCN and financial assistance from USAID.

The NES was the first environmental strategy in Jordan, and indeed in the Arab world. It has responded in content and recommendations to a large extent to the famous "World Conservation Strategy" of 1980 formulated by IUCN, UNEP and WWF.

Based on the NES, Jordan was in a good political and strategic position to sign and then ratify the Convention on Biological Diversity (CBD) and the UN Framework Convention on Climate Change (UNFCCC) in 1992 during the Earth Summit. Two years later Jordan signed and then ratified the UN Convention to Combat Desertification (UNCCD).

Completing most of its international obligations and on the foundations of the NES, Jordan opted to develop a practical environmental action plan in 1995. The National Environmental Action Plan (NEAP) was prepared in a national consultation process coordinated by the Ministry of Planning and it included a prioritized action plan based on results.

The NEAP remained to be the environmental guidebook in Jordan, with most of its proposed projects either implemented or started to implement. In 2000, Jordan launched its multi sectoral National Strategy for Sustainable Development which was called "National Agenda 21" with technical and financial support from UNDP. The National Agenda 21 involved the participation of numerous organizations and individuals and was the most important participatory and learning-by-doing policy formulation effort in Jordan to date.

Between 1998 and 2005, an array of sectoral policies, strategies and action plans were developed and paved the ground for a solid policy framework. A total of 12 environmental related policies and action plans were developed between 1998 and 2005 covering water, poverty, agriculture, tourism, biodiversity, energy, youth, socio-economic development, childhood and desertification.

The National Biodiversity Strategy and Action Plan (NBSAP) was launched in 2003 while the National Action Programme (NAP) to combat desertification was launched in 2006. Until now, no national policy for climate change was prepared.

**(a) A brief description of the NBSAP, identifying the main or priority activities;**

Jordan was one of the original signatory countries of the CBD in 1992 at the Rio summit, and it ratified the convention in 1993. Jordan has also ratified all other supporting international conventions on biodiversity including Ramsar, the World Heritage Convention, the UNCCD and the Cartagena Protocol on Biosafety.

Jordan is also a state member of the IUCN and the UNESCO Man and Biosphere programme (MAB).

Under the CBD, Jordan has produced its national Biodiversity Country Study in 2000 and the National Biodiversity Strategy and Action Plan (NBSAP) in 2003. The NBSAP includes several project proposals within an action plan for biodiversity conservation at the national level. It has been the first country in the region to develop a national framework on biosafety.

The NBSAP (2003) addressed this target in the form of strategic objectives, and those are:

1. Conserve biodiversity and use biological resources in a sustainable manner by protecting the various species of animals, plants and micro-organisms in their different agricultural environments; and productivity of environmental systems, especially forests, grazing land and agricultural land within a balanced environmental order.
2. Improve the understanding of ecosystems, increase our resource management capability; and promote an understanding of the need to conserve biodiversity by using biological resources in a sustainable manner;
3. Managing natural resources and distribute roles among institutions in a way that conserves the basic natural resources which are necessary for human growth and survival, such as soil, water, plant cover and climate, developing these elements and using them appropriately in a sustainable manner.
4. Maintain or develop incentives and legislation that support the conservation of biodiversity and the sustainable use of biological resources; and
5. Work with other countries to conserve biodiversity, use biological resources in a sustainable manner and share equitably the benefits that arise from the utilization of genetic resources.

The Strategy recognizes that the conservation of biodiversity and the sustainable use of biological resources are fundamental to Jordan's local communities. It describes mechanisms through which these communities will be able to develop their own understanding of, and response to, the Convention.

❖ **Priority Actions:**

The National Strategy and Action Plan proposes a series of priority actions and projects that are classified according to the following themes involving most sectors of society:

❒ **Flora and Fauna Resources:**

- Wild Plant Resources (Flora).
- Wildlife (Terrestrial and Freshwater Wild Fauna)
- Marine Life and Fisheries.
- Microbiology

❒ **Protection of Natural Resources:**

- Endangered species.
- Protected areas and *Ex situ* conservation

❒ **Agriculture Resources:**

- Forests
- Rangeland
- Plant Production
- Animal Production

❒ **Mineral Resources and Industry:**

- Mineral Resources
- Industry and Energy
- Biotechnology and Biosafety,
- Eco-Tourism.

❒ **Land Use and Water Resources:**

- Land Use, and Urban Development.
- Water Resources.

❒ ***Economy, Legislation, and Awareness:**

- Economic value
- Awareness, Education, Research Coordination and Eco-citizenship (Participation of the Public, Government, Non-Governmental Organizations and Private Sector).
- Legislation, and Institutional Structure

The strategy recognizes the social, economic and ecological values of forests and that their conservation and sustainable development are fundamental to Jordan's local communities. The strategy addresses the need to ensure the conservation of marine and coastal life and sustainable harvesting of commercial fish, and the need to ensure the conservation and sustainable use of rangelands. It describes mechanisms through which these communities will be able to develop their own understanding of, and response to, the Convention.

**(b) An indication of whether and where targets and indicators (both global and national) adopted under the Convention have been incorporated into NBSAPs;**

**(c) Information on how activities under the NBSAP contribute to the implementation of the articles of the Convention and the thematic programmes and cross-cutting issues adopted under the Convention;**

❖ **Synergies and Cross-cutting Issues:**

There are many common operational obligations under the Rio Conventions, including requirements for reporting, research, training, public education, awareness and national exchange of information. Experience in capacity development for global

environmental management to date, points to an overarching need to strengthen coordination of environmental policy formulation and implementation among sectoral agencies at national (and sub-national) levels.

Institutional weaknesses at the national and agency level, e.g., lack of coordination among Convention focal points, often limit realization of linkages among Multilateral Environmental Agreements (MEAs).

The NCSA Resource Kit identifies potential approaches to ensure that possible synergies are identified through the NCSA process.

Some MEAs and international organizations have sought to identify potential areas of synergies between the Rio Conventions. Some examples of these efforts were:

- Mobilizing information and knowledge about synergies, especially among policymakers.
- Engaging and building consensus among all stakeholders on synergies.
- Mainstreaming MEAs into sectoral issues needs to be promoted strategically.

The UNFCCC identified activities to promote synergies under six cross-cutting thematic areas for implementing the Rio Conventions:

2. Technology development and transfer;
3. Education and outreach;
4. Research and systematic observation;
5. Capacity-building;
6. Reporting; and
7. Impacts and adaptation.

The CBD identified the following areas for possible synergies with UNFCCC and broader sustainable development planning, specifically among the mitigation and adaptation activities:

1. Land use, land-use change and forestry
2. Improved management of grasslands
3. Avoiding degradation of peat lands and mires
4. Revegetation

❖ **Strategic cross-cutting priorities in Jordan:**

The cross-cutting stocktaking report has identified the following set of strategic priorities for synergies and cross-cutting issues between the three conventions:

**1- Knowledge Management, outreach and networking:**

Since efforts in implementing the three conventions are divided between various sectors and institutions, a priority need will be to develop the national knowledge management capacity for synergies between the three themes. Information should be collected, saved, processed and exchanged between institutions and professionals through effective knowledge management networks whether these networks already exist or should be developed. The knowledge management system could act as a tool for unified monitoring for environmental components and reporting requirements of the three conventions.

Although many awareness and outreach programmes have been implemented in Jordan on sectoral basis, there is still a need to advocate the integrated synergies between the three conventions for various stakeholders to keep up with new technical developments. Any awareness and outreach programme should be considered as a tool for capacity development and not an end by itself.

**2- Technical training and technology transfer:**

Technology transfer and cooperation is important to all three conventions. The Rio Conventions emphasize the importance of technology co-operation and transfer in achieving their respective goals. Mutually supportive technologies like renewable energy, agriculture efficiency and ecosystem preservation will be of high value to address the common elements and synergies from a technological perspective.

Environmental and technical training packages developed by and for national institutions should begin to focus on linkages and synergies between the conventions. Programmes must be developed to utilize existing national and regional specialized centers to provide courses in technical areas relevant to all three conventions to targeted audiences. Another training tool could be course materials for technical professionals and agency staff on issues relevant to the three conventions — and the synergies, complementarities, and areas of overlap

that exist — to be used in structured courses, workshops, and seminars. Such training programmes will increase the practical capacity by proof and evidence of the success stories in synergies and provide hands-on experiences to be applied in local conditions.

**3- Sustainable Institutional Coordination Mechanisms:**

Although the Ministry of Environment is the focal point for all the three conventions, the implementation of obligations depends upon the active involvement and commitment of other institutions especially line governmental institutions and some NGOs. This requires a dynamic and sustainable coordination mechanism between the various institutions and to present the synergy perspective to all those institutions. This will help in developing integrated responses to the commitments and inter-linkages between the conventions.

**4- Using research for policy making:**

The existing research in the educational system in environmental sciences and natural sciences in general does not adequately address scientific and practical linkages between the themes of biodiversity, desertification and climate change, and between these themes and the natural environment. Education on global environmental issues can promote the development of an increased awareness and understanding of the impact of local actions that degrade the environment sustainable development and human well being and will assist in developing educational packages that address the three themes and their cross-cutting issues in an integrated manner.

Concepts related to the synergies between the conventions should be integrated in educational programmes and curricula to ensure a sustainable flow of education packages and an integrated approach to education for environmental management and linkages between the three themes.

Another important capacity development priority is creating an enabling system for linking scientific research to policy making. Scientific research should focus on cumulative and synergistic impact assessments of the linkages between biodiversity loss; desertification and climate change and produce informed decisions on integrated responses and mitigation plans. Research on adaptation to climate change would be an essential component of cross-cutting research options.

The stocktaking report has also identified that the main cross- cutting concepts advocated by the conventions and which constitute the main policy elements of

biodiversity, desertification and climate change are not well reflected in current national development and sectoral policies in a clear and integrated manner. Linkages between the Rio conventions and poverty eradication should be emphasized to ensure the credibility of integrating the themes into development policies. A major capacity development effort should be taken to increase the awareness and familiarity of decision makers with the concepts developed by the conventions.

**5- Resource Mobilization:**

Most institutions in Jordan lack the technical and practical knowledge for financial and technical resource mobilization to implement projects and programmes tackling synergies between the three themes. This is a major field for capacity development at institutional and individual levels since financial constraints represent some of the major difficulties facing environmental management in Jordan. Integrated resource mobilization can also help in minimizing overlaps and maximizing the benefits from international aid.

**6- Local Communities empowerment and participation:**

Communities are the end beneficiaries of any environmental management programme. Local communities' capacities to address issues of biodiversity, desertification and climate change should be developed in a sound technical way keeping close attention to the linkages with sustainable livelihoods. This can be done through capacity development for local institutions (municipalities, NGOs, CBOs, etc…) to enable them to develop their own initiatives to implement global environmental thinking in the local context.

**8. An overview of progress made in implementation of priority activities or actions, focusing on concrete results achieved;**

**Jordan's efforts in Biodiversity Conservation:**

Jordan has taken comprehensive steps in conservation of natural resources and biodiversity.

- Jordan has a network of 7 operating protected areas and another 5 suggested protected areas. The protected areas in Jordan are managed by a national NGO: The Royal Society for the Conservation of Nature (RSCN) according to an agreement with the Ministry of Environment, making it a unique experience in decentralizing protected areas management in the Arab world.
- As Biodiversity conservation is being shared by many public and civil organizations in Jordan, a national biodiversity committee was established within the process of developing the NBSAP and it functions as an advisory group on biodiversity issues for the MoEnv.
- Throughout Jordan, many examples have been developed in implementing local community- based conservation projects that link between biodiversity conservation and meeting local livelihood demands.
- Some of the main successes and case studies of excellence in this aspect were developed by the GEF Small Grants Programme (SGP)
- Jordan has implemented many biodiversity conservation projects in the past decade, mainly based on GEF support. Some of the most notable previous biodiversity conservation projects are:

1. Conservation of the Dana and Azraq Protected Areas

2. Biodiversity Country Studies - Phase I
3. Biodiversity Strategy and Action Plan (BSAP) and Report to the CBD
4. Conservation and Sustainable Use of Dryland Agro-Biodiversity of the Near East.

- ❒ Currently, an impressive set of biodiversity conservation projects is being implemented that contains the following:
  8. Conservation of soaring migratory birds in the eastern sector of the Africa-Eurasia flyway system (Rift Valley and Red Sea flyways)
  9. Conservation and Sustainable Use of Biodiversity in Dibeen Nature Reserve
  10. Conservation of Medicinal and Herbal Plants
  11. Integrated Ecosystem Management in the Jordan Rift Valley
- ❒ The Jordanian National Biodiversity Strategy and Action Plan (NBSAP) is a response to the obligations of CBD and has been developed as a guide to the implementation of the biodiversity convention in the country.
- ❒ It has been published by the Ministry of Environment in 2002 based on a national consultation process.
- ❒ The NBSAP contained five main themes under which specific projects were proposed:
  1. Protection of biological resources:
  2. Sustainable use of biological resources.
  3. Reducing the impact of mining on biodiversity.
  4. Promoting integrated land use planning, water resources development, land tenure and land use planning
  5. Towards a biodiversity-oriented society.
- ❒ Jordan hosts the regional World Conservation Union (IUCN) Office for West, Central Asia and North Africa (WESCANA) and has a 13-member strong IUCN national committee based on public and civil society organization.
- ❒ Jordan is also the host of the Middle East branch of BirdLife International. This organizational system provides a conducive environment for biodiversity conservation if effective coordination mechanisms are developed and operated.

**9. An indication of domestic and/or international funding dedicated to priority activities;**

**10. A review of successes and obstacles encountered in implementation and lessons learned;**

**The lessons learned**:

- ✓ From previous biodiversity-centred projects in Jordan and especially the Dana Wildlands Project, a pilot-phase GEF project executed by the Royal Society for the Conservation of Nature that pioneered the concept and practice of integrated conservation and development within the Middle East Region. It was particularly innovative in the development of community based income generation and eco-tourism ventures and demonstrated that market driven enterprises based on protected area resources could support biodiversity conservation programmes.

- ✓ It also demonstrated that sustained capacity building, focusing on institutional as well as technical aspects, can generate enormous improvements in the effectiveness of executing agencies. While the project was judged to be successful overall, a number of problem areas were identified, notably the lack of attention given to ecological processes when formulating management strategies, the need to reduce grazing pressure through a more vigorous outreach programme for Bedouin communities and the need to set realistic time scales to create viable community driven business enterprises.
- ✓ A salient lesson learnt from other projects in Wadi Rum and Azraq, which involved several ministries and NGOs as executing agencies, is the need to have the institutional arrangements for project coordination and management simple and clearly defined, with a single agency as executing agency and the others as implementing agencies.

❖ **National Priority Capacity Constraints in the implementation of CBD:**

The CBD stocktaking report identified the following national capacity constraints for implementing the CBD listed according to priorities as classified by stakeholders. These constraints include:

15. Low integration of the CBD concepts in the national policy formulation process:
16. Weak linkages between research and policy making:
17. Lack of national directives for Biodiversity Impact Assessment:
18. Lack of clear policies for regional and international technology transfer:
19. Incomplete national guidelines and management plans for conservation sites:
20. Lack of an institutional process for assessing the impact of regional and international agreements on biodiversity:
21. Low national capacity of community management for in-situ conservation outside the protected areas:
22. Lack of economic incentives and valuation of biodiversity components:
23. Weak mobilization of financial resources available for Biodiversity:
24. Lack of long-term coordination mechanism between institutions working in Biodiversity:
25. Weak institutional and legislative framework for regulating access to genetic resources and benefits sharing:
26. Lack of a national knowledge management and data processing system for monitoring and reporting on Biodiversity:
27. Lack of long term programs for awareness and education on new concepts in Biodiversity management.

Another important obstacle is financial and directly related to the fact that the protection and sustainable use of biological diversity is not a priority for the government. In spite of the fact that state budget financing for nature conservation is annually increasing, this is still insufficient to fulfill all obligations under the CBD.

Several other obstacles stemming from the above two main obstacles can be listed:

(a) There is a lack of qualified and properly skilled personnel in governmental "non-conservation" sectors;

(b) Biodiversity is a relatively specific concern for public administration and the staff therefore lacks the relevant training;
(c) Brain-drain of qualified personnel into the private sector;
(d) Competition with "grey" issues within the environmental sector, which still hold a higher priority than the "green" ones;
(e) Inter-sectoral and inter-institutional cooperation could be improved: cooperation between different ministries is insufficient; NGOs (except RSCN) and the private sector are often forgotten, etc.

**11. An analysis of the effectiveness of NBSAPs, focusing on:**

**Whether observed changes in status and trends in biodiversity (as described in Chapter I) are a result of measures taken to implement NBSAPs and the Convention;**

**Whether the current NBSAP is adequate to address the threats to biodiversity identified in Chapter I**

**How implementation of NBSAPs may be improved, where necessary, including suggestions of possible ways and means to overcome identified obstacles.**

❒ **Suggestions to Overcome Obstacles:**

The following actions in each field are suggested:

❖ **Overcome gaps in biodiversity policies:**

1. A comprehensive capacity building/awareness plan to integrate CBD concepts in national policies and legislation is operational.
2. A practical framework for linking biodiversity with poverty reduction policies and efforts is developed.
3. National policy statements/plans for conservation of different habitats and thematic programmes identified by the CBD are developed.
4. A national programme for monitoring the progress towards achieving the Biodiversity 2010 targets is developed including identification of national indicators.
5. National operational guidelines for implementing the ecosystem approach developed with one/two demonstration projects implemented.

❖ **Linkages between research and policy making**

1. An accessible database of research on biodiversity and conservation is established.
2. Scientific research used for enhancing monitoring of biodiversity components and development of habitat specific and species-specific conservation plan.
3. A special capacity building programme for taxonomic research is developed and operational in relation to the CBD GTI programme.

- **Biodiversity impact assessment and guidelines for restoration of degraded sites:**
  1. Guidelines of the Biodiversity Impact Assessment including the biodiversity directives are developed.
  2. A training programme for Biodiversity directives in EIA is established and operational.
  3. A national system of guidelines for restoration/rehabilitation of degraded habitats is developed and operational.

- **National policies for regional and international technology transfer:**
  1. A national inventory of available technologies related to biodiversity is conducted as well as a technology needs assessment.
  2. A national policy statement and/or required legislation on technology transfer is developed and operational by relevant stakeholders.
  3. Regional and international networks for technology transfer are developed based on national inventory and policy statements.

- **National guidelines and management plans for conservation sites**
  1. Comprehensive comparative review of the current management systems of conservation sites is conducted with gap analysis.
  2. Capacity building and training programmes for conservation site management are developed and operated.
  3. All conservations sites in Jordan have management guidelines related to their specific uses and functions, is functional.

- **Institutional process for assessing the impact of regional and international economic and trade agreements on biodiversity**
  1. A retroactive analysis and assessment of the impacts of trade and economic agreements on biodiversity is conducted.
  2. A national framework for strategic environmental assessment is developed and operational.
  3. A national training programme on strategic environmental assessment is developed and operational.
  4. An effective institutional system to be used for assessing the potential impacts of new trade and economic agreements on biodiversity is functional.

- **National capacity for in-situ conservation outside protected areas, including lack of capacity of community management:**
  1. A national plan to identify key habitats outside protected areas is designed.
  2. Key species important for conservation are identified and conservation plans are designed based on species level.
  3. A training programme on community management of biodiversity outside protected areas is developed based on previous and current national experiences.
  4. A national programme for the management and control of invasive species is developed and implemented with the partnership of community management.

5. Awareness toolbox for conservation of key species and sites is produced.

❖ **Economic incentives and valuation of biodiversity components:**

1. Suitable economic incentives for biodiversity and natural resources management are identified and applied.
2. Training programme on economic incentives and valuation tools are developed.
3. Business plans for biodiversity conservation projects between private sector and other stakeholders are developed.

❖ **Mobilization of financial resources available for biodiversity:**

1. Available resource mobilization tools and opportunities for biodiversity are reviewed.
2. A system for private-public partnership for resource mobilization is developed.
3. Training programme on resource mobilization is developed.
4. Resource mobilization strategy for biodiversity is prepared and implemented.

❖ **A long-term coordination mechanism between institutions working on biodiversity:**

1. A national institutional coordination mechanism for biodiversity is established.
2. An effective monitoring and evaluation system is produced.

❖ **Institutional and legislative framework for regulating access to genetic resources and benefit- sharing:**

1. A review of existing mechanisms for genetic resources management is prepared with gap analysis is conducted.
2. Legislation on regulating access to generic resources and benefits sharing ready for implementation.
3. A training programme on the access and benefits sharing of genetic resources is operational.

❖ **A national knowledge management and data processing system for monitoring and reporting on biodiversity:**

1. A Knowledge management needs-assessment and gap analysis for biodiversity information i performed.
2. Biodiversity monitoring indicators identified and sources of data verified.
3. Knowledge management network established.
4. A training programme in the use and maintenance of the KM system is functional with data updated on frequent basis.

❖ **Long-term programmes for awareness and education on new concepts in biodiversity management:**

1. Main emerging CBD concepts for the education/awareness programme identified.
2. Gaps in current education and awareness programmes identified through a comparative survey.
3. Education/awareness programme designed to fill the gaps.

# Chapter III

## Sectoral and cross-sectoral integration of biodiversity considerations

**The integration of the CBD concepts into national programs** is in itself a commitment by each signatory state. These main elements include identifying and monitoring of the major components of biodiversity and the processes which affect them, establishing systems for in-situ and ex-situ conservation, attempt sustainable use of components of biodiversity, create incentive measures for the conservation of biodiversity, creating and using national capacities for research and training, promoting public education and awareness, introducing national EIA standards for biodiversity, allowing, within legal limits of intellectual property rights, access to genetic resources and access to and transfer of technology and information as well as mechanisms to create and use equitably of biotechnology.

There are some examples where attention is paid in national policies to the main elements of the CBD. For example, the National Agricultural Strategy placed the "conservation of biodiversity and utilizing it in integrating and supporting agricultural development" as a general objective of the strategy. To this end, the Strategy calls for the use of local species in agriculture, and the use of local medicinal and aromatic plants for the benefit of local cooperative societies. Similarly, the NSAP-Biodiversity calls for the participation of farmers in the conservation of biodiversity.

The National Strategy for Combating Poverty (2002) called for the encouragement of sustainable livelihoods in rural areas. This entails the encouragement of use of natural resources by local communities in ways that can be considered both sustainable and rewarding.

The National Biodiversity Strategy and Action Plan (NBSAP) is the main biodiversity planning policy document. It includes good focus on the conservation and sustainable use of biodiversity in its various elements, but falls short of a clear integration of "access to genetic resources and benefits sharing" which is the third pillar of the CBD. This has been highlighted by another biodiversity-related capacity constraint that will be discussed below.

Some of the protected areas in Jordan, such as Dana and Ajloun, have integrated some of the concepts of CBD concepts, especially ecotourism and sustainable livelihoods into the management programme. This is potentially a very useful tool in integrating local societies into the conservation efforts. This experience may well be used both in official nature reserves and within environmentally sensitive areas which have not been designated as nature reserves.

None of the national strategies or programmes emphasizes the importance of education and awareness among decision makers to the concepts of community based conservation. This will need to be addressed if successful integration of conservation into poverty alleviation programs is to be realized. This is especially important in areas which have not been designated as nature reserves.

While there are some aspects of the CBD which have not been given enough attention to in Jordan's policies related to biodiversity, as will be clear later, many of the main elements are in fact finding their way to implementation.

**Gaps in biodiversity policies:**

National policies in Jordan have missed the importance of developing national policy measures and statement on the thematic CBD issues and different types of habitat

conservation (inland water biodiversity, mountain biodiversity, marine biodiversity, forest biodiversity, dry land biodiversity, etc…) and it is crucial that national and even local (habitat-level policies) be developed in relation to the various components of biodiversity.

Such an objective can benefit from the various programmes of work developed by the CBD for the different thematic habitats and ecosystems.

Another main missing point in the national policy and planning process related to CBD is the lack of any integration or follow up of the 2010 Biodiversity targets. In decision VI/26, the Conference of the Parties adopted the Strategic Plan for the Convention on Biological Diversity. In its mission statement, Parties committed themselves to a more effective and coherent implementation of the three objectives of the Convention, *to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on earth.*" In decision VII/30, the Conference of the Parties adopted a framework to facilitate the assessment of progress towards 2010 and communication of this assessment, to promote coherence among
the programmes of work of the Convention and to provide a flexible framework within which national and regional targets may be set, and indicators identified. Parties are invited to establish their own targets and identify indicators, within this flexible framework.

The targets are not well known in Jordan and have not been monitored and documented in a satisfactory way. It is important to keep track and evaluate on a continuous basis the progress towards achieving the 2010 Biodiversity targets.

In the last few years, the ecosystem approach has been developing as a main tool of adequate management and sustainable use of biodiversity and habitats supported by a robust operational guidelines developed by the CBD. The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. Application of the ecosystem approach will help to reach a balance of the three objectives of the Convention. It is based on the application of appropriate scientific methodologies focused on levels of biological organization which encompass the essential processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of ecosystems.

As described by the Conference of the Parties, the ecosystem approach is the primary framework for action under the CBD. The Conference of the Parties, at its Fifth Meeting, endorsed the description of the ecosystem approach and operational guidance and recommended the application of the principles and other guidance
on the Ecosystem Approach (decision V/6). The seventh meeting of the Conference of the Parties agreed that the priority at this time should be on facilitating implementation of the ecosystem approach and welcomed additional guidelines to this effect (decision VII/11).

Jordan is in need to localize the ecosystem approach in its various conservation, sustainable use and restoration plans to implement the ecosystem approach at the national level based on CBD framework and principles.

Based on the Environmental Protection Law 2005, a variety of environmental bylaws were formulated including the bylaw no 29 for the year 2005 specific for "natural

reserves and parks". The bylaw includes procedural and planning guidelines for identification and establishment of protected areas, which includes the necessity for developing a site management plan. The bylaw provides the Minister of Environment with the legal power to declare any area that is rich in biodiversity as a "special protection zone" managed through regulations issued by the Ministry.

**The main directions of national policies are expressed in development plans, action plans made to put them into practice, sectoral policies and other similar documents.**

**National development plans:**
**National Master Plan Jordan 2010**

**State Budget Strategy 2007-2010**
**The National Strategy for Agricultural Development 2002-2010**

- ❒ **The Future Vision for the Agricultural Sector by 2010**
- ✓ Stable and sustainable agriculture in the JV based on advanced production technologies that maximize the return per unit of production (especially water), while protecting and developing agricultural resources and sustaining their productivity.
- ✓ A sustainable irrigated agriculture in the Highlands, within the limits of water resources available for irrigation, based on advanced production technologies that meet local market demand for fruits and vegetables and export opportunities.
- ✓ Agricultural production based on demand, with marketing infrastructure and organizations that are capable of meeting local and export market demand and agricultural industries
- ✓ Strict management of water resources that ensure the quantity and quality of water allocated for irrigation during the period 2001- 2010 to protect current and future investments in irrigated agriculture.
- ✓ Rain-fed agriculture that is based on improved, diversified and integrated agricultural cropping systems using modern technologies, and the expansion in the production of high-value cash crops, depending on family labor.
- ✓ Government adoption and application of national legislation and international agreements for the protection of agricultural resources from deterioration, preventing their misuse and ensuring the continuity of efforts required to maintain resource productivity, and improve their utilization.
- ✓ A stable organizational structure for the development of agriculture based on an organizational approach in planning and implementation,
- ✓ A legislative, financial, and marketing infrastructure that provides a stable and suitable climate for the PS to invest in agriculture,
- ✓ An effective Agricultural Council that coordinates the efforts of the different government institutions, in setting agricultural policies and following up their implementation.

- ✓ An agricultural sector that contributes to the protection of the natural environment and the agricultural resources (including soil, water and biodiversity), maintaining the cleanliness and beauty of the country-side, and surrounding residential settlements with prosperous agricultural areas.
- ✓ Farmers and PS organizations fully and effectively participating in the economic and social progress of the country.
- ✓ - Government policy protecting the interests of all groups working in the agricultural sector, to achieve economic and social equity across the different economic sector, and support integrated development in rural areas.
- ✓ - A stable government policy to develop and improve its programs in agricultural research and extension, marketing, and credit, as well as agricultural services, to facilitate the implementing the National Strategy for Agricultural Development (NSAD).
- ✓ - A government policy that designates the agricultural sector as the basis for socio-economic development of the rural areas.
- ✓ - A committed political will to implement the NSAD and government agencies capable of taking the required measures to implement the legislation and instruction approved by the government for protecting the environment and natural resources, specifically in the fields of preventing illegal extraction of groundwater; the rights in surface-water use and in preventing abuse of rangelands, forestlands, and protecting the environment.

❒ **The Main Objectives of the Agricultural Development Strategy:**

➢ <u>Economic Objectives</u>

1. Provide a suitable environment for the private sector to effectively participate in agricultural development.
2. Increase investment in the agricultural sector.
3. Enhance integration between plant and animal production.
4. Provide new job opportunities and work in the agricultural sector.
5. Increase incomes of farmers and workers in the supporting agricultural activities.
6. Ensure economic equity between agriculture and others sectors of the economy and within the agricultural sector itself.
7. Increase productivity and decrease production costs.
8. Improve the competitiveness of produce in quality and price in local and export markets.
9. Increase agricultural production and increase its contribution to the GDP.
10. Increase the degree of self-reliance in food, and improve the agricultural trade balance.
11. Attain integration between the agricultural sector and the other economic sectors, especially in the area of processing of agricultural products.
12. Link domestic supply with market demand.
13. Develop farmer organizations and other private-sector groups working in the agricultural sector.

➢ <u>Social Objectives</u>

1. Limit migration from rural areas into urban areas.

2. Increase women participation in agricultural development.
3. Enhance the capabilities of farmers and agricultural workers, and develop their knowledge base and abilities to effectively participate in the socioeconomic development of the rural areas.
4. Improve health, educational, social services, and living standards for rural people.

➢ Environmental Objectives

1. Conserve land, water and natural vegetation, and utilize them within their production capacity to ensure sustainable and long-term agricultural production.
2. Conserve Jordan's biodiversity and utilize it in supporting agricultural development.
3. Improve the technical and managerial capabilities in the agricultural sector to cope with probable climate and environmental changes, and absorb their consequences.

➢ Cooperation with Arab Countries Objective

1. - Achieve integration in agribusiness among Arab countries, including the establishment of joint projects for processing of agricultural procedure based on economic and social feasibility, and the extent they achieve integration between Jordan and neighboring Arab countries.

❒ **The Environmental Dimension of Agricultural Development**

- ✓ Agriculture affects the conservation of natural resources and their sustainable use more than any other sector. Agricultural development is concerned with the conservation of natural resources and their rational use. If land and natural vegetation (forests and rangeland) are not utilized in a balanced and sustainable way, their properties and productive capabilities will deteriorate. Such degradation reduces their value as an economic resource, and results in an environmental imbalance that leads to non-sustainable development.
- ✓ Agriculture has an important environmental role to play in conserving bio-diversity, natural vegetation, soil, water, flora, and fauna. The significance of this role is related to its major contributions to reduce the threats of both desertification and environmental degradation, and of land, water resources and biodiversity. Natural resources must be protected to provide the requirements for sustainable agricultural production in the long-term.
- ✓ Due to the continuous increase in the amount of treated waste water, which is expected to reach 177 MCM in 2010, 219 MCM in 2015, and 246 MCM in 2020, agriculture is the only sector that is expected to accommodate the utilization of this type of water, through systems that ensure environmental safety and public health.
- ✓ It is obvious that continued neglect of agriculture and reduced government support to its development will result in grave environmental consequences, especially regarding land and water. Degradation of natural resources may reach a level that is deemed too costly to reverse, if indeed it can be.

- ✓ Regarding environmental benefits, agriculture continues to play a crucial role in protecting land, water, and natural vegetation from deterioration, and in maintaining the productive capacity of these resources for sustainable development and protection of agro-biodiversity. Not less important, agriculture can mitigate the impacts of new environmental problems such as the increasing use of treated wastewater.

**Sustainable Jordanian**
**Agenda 21**

The national Agenda 21, 2001 addresses conservation of genetic diversity more directly, setting out the following objectives:

1. Assess the species diversity of wild flowering and non-flowering plants
2. Identify rare; endemic and endangered native plant species.
3. Produce Red-Data Book for endangered, rare and extinct plant species in the country.
4. Encourage the development of methods and strategies for propagating and cultivating endemic, endangered and rare plants, with special emphasis on the potentialities of the Badia area as a rich source of plant genetic material.
5. Establish a national center or centers for the conservation of germ plasm (e.g., botanical garden, herbarium, national / regional propagation units, seed bank).
6. Adopt a policy to encourage exchange of germ plasms with regional and international
7. Capacity building for environmental institutions
8. Conduct identification and conservation of aquatic (marine, fresh and brackish water) plants.
9. Establish a special herbarium for algae and fungi.
10. Conserve and manage endemic and relict species and their habitats such sand dunes, the Dead Sea and Jordan River habitats.

**Coalition agreements of the government**

**National Tourism Strategy 2004-2010:**

- ❒ The Ministry of Tourism has developed the National Tourism Strategy 2004-2010 with a private-sector led perspective on placing tourism as a major income-generating and revenue based sector. This strategy did not address the need to assess, monitor and measure the impact of tourism on biodiversity.
- ❒ However, the RSCN implements similar activities within the established nature reserves as pat of the over all environmental management of these sites. A Tourism development plan is prepared for each reserve; the effect of tourism on certain sites is measured and assessed. The RSCN is concerned with these impacts and intends to address this issue in the coming Integrated Ecosystem Management Project in the Jordan Valley.

- ❒ The Royal Society for the Conservation of Nature (RSCN) runs awareness programmes targeting tourism operators and aiming at promoting ecotourism and increases their awareness of the impacts of tourism on biodiversity and upgrade the technical capacity at the local level to minimize the impacts.
- ❒ The RSCN has already provided special training programs for tourism operators for some private companies and according to their request.
- ❒ The National Tourism Strategy 2004-2010 does address the role of the local community in tourism in general by providing that "Tourism should target the citizens and communities of Jordan as its primary beneficiaries by providing opportunity for income generation and employment, and by positively contributing revenue to Government programmes, supporting quality of life, environmental excellence and the development of society."
- ❒ Conservation and Sustainable Use of Biodiversity in Dibeen Nature Reserve: The project will also build in-country capacity in forest management and conservation-oriented land use planning. Specific objectives are to designate and establish a nature reserve with the Regional Forest Park; prepare and implement conservation management plan and eco-tourism development plan; develop a competent and effective reserve and forest park management team; and a land use plan for the regional forest park.
- ❒ It is the RSCN policy to hire and train qualified individuals from the local communities living within or close to forests, thereto, the RSCN hired locals as managers, researchers, eco-tourism guides, and rangers at the established forest nature reserves and parks. The RSCN provided and continue conducting on job training to these employees. Also, the RSCN provides with technical assistance to local civil society organizations, aiming at enhancing their capacities and awareness in order to have them heavily involved in the protection of forests. The RSCN also assists these societies to acquire funds for their activities, and for the establishment of environment friendly small and medium enterprises alternative to some ongoing environmentally unsound economical activities.

**Environment:**

**Environmental Strategy**

**CITES:**

Jordan is a signatory of CITES. RSCN is the national body responsible for the convention in the country. Wildlife Enforcement Section at the RSCN has been working in coordination with all related governmental bodies in order to control trade of endangered species of flora and fauna. These bodies include the public security, the army and the customs. Trade in raptors, especially in falcons, is one of the main concerns in Jordan. The control on this type of trade is being considered as a top priority by all related bodies.

RSCN is responsible for giving the CITES permissions, including flora and fauna. There are 4 plant species on the CITES appendix II (one of them includes 4 subspecies).

Jordan is committed to applying the convention's conditions. Several national workshops were conducted in the last years for all stakeholders to raise the level of awareness on CITES convention.

**Conservation of Medicinal and Herbal Plant Project.**

Jordan Government launched the project as it realized the importance of medicinal and herbal plants as a promising sector in the country. The Global Environment Facility (GEF) is funded the Conservation of Medicinal and Herbal Plants Project and is being implemented by the World Bank (WB) and the Ministry of Planning and International Cooperation (MOPIC). The project emerged from the crucial needs of the country to conserve wild medicinal and herbal (M/H) plant resources and to promote an economical promising and value adding M/H plant sector

Thus, it is expected to receive governmental and non-governmental appreciation and support. The project also responds to the feedback obtained throughout preparation from all stakeholders (from subsistence farmers to the private sector). The project will be the first to address the conservation of M/H plants and give priority to the field of M/H plants. Furthermore, it will initiate and strengthen the institutional and technical capacity of key partners in this area including the Enhanced Productivity Program of Ministry of Planning (EPP/MOP), the National Centre for Agricultural Research and Extension (NCARE), Royal Society for the Conservation of Nature (RSCN) in addition to the private sector.

The Conservation of Medicinal and Herbal Plants Project aims at:

- Identification of species in high demand in the area and available medicinal plants used for human and livestock healthcare
- Identification of primary collectors and all current and potential local users of medicinal plants and the impact on medicinal plant resources
- Estimating the biomass of palatable plant species, including targeted medicinal plants and calculating the carrying capacity for livestock grazing in Mujib reserve.
- Documenting localities and traditional names of medicinal plants used in Mujib Nature Reserve and surrounding area; and the traditional use of these medicinal and herbal plants by the laymen, Hajat and herbalists;
- Documenting method of preparation and conservation used by the primary users and collectors and any wrong use, adverse effects of the plants used by locals and herbalists.

**Integrated Eco-system Management in the Rift Valley:**

The main objective of the "Integrated Eco-system Management in the Rift Valley " Project is to secure the ecological integrity of the Jordan Rift Valley , as a globally important ecological corridor and migratory flyway, through a combination of site protection and management, nature – based socio-economic development and land use planning .through :

- Establishment of a network of 4 protected areas in the rift valley with management programs, safeguarding key habitats.
- Conservation oriented land use plan for ecologically strategic areas of the rift valley
- Effective institutional and operational systems in place for the enforcement of all environmental laws and regulations governing infrastructure and building development , industrial processes and other land uses and activities of the rift valley.
- New and improved facilities constructed and new operational systems developed for the treatment and reuse of wastewater from the urban, agricultural and industrial sources through the associated proposed rift valley improvement project.

**Environmental Impact Assessment:**

In accordance with decision VI/7, the current EIA bylaw requires the following for all development projects planned in the country:

1. A screening process whereby the Ministry of Environment determines whether the project requires a comprehensive EIA, a preliminary EIA or no EIA.
2. In case of a comprehensive EIA, a scoping session is required, whereby all stakeholders are invited to participate and express their opinions on the project. The aim of scoping is to determine the significant environmental impacts of the project.
3. If the preliminary EIA showed that it may have a major impact on the environment, then a comprehensive EIA is in order. According to Annex 4 of the bylaw, major impacts include the following:
    a. Largely affects a rare or endangered species of plant or animal.
    b. Affects the movements of any kind of fish or wild animals residing or migrating in the area.
    c. Significantly decreased resources available to fish, wild animals or plants.
    d. Created a health hazard to animals or plants in the area.
4. According to Annex 5, the EIA report should include the following:
    a. Policy, legal and administrative framework.
    b. Project description
    c. Baseline data
    d. Environmental impacts
    e. Analysis of impacts
    f. Mitigation Plan

Environmental Monitoring and Post-Auditing Plan

**The National Action Programme (NAP) to combat desertification**:

Most of Jordan arid and semi-arid areas have suffered desertification. Although the rate of desertification was not identified, however several surveys and studies at the

country's level indicated that Jordan's land is at the threat of high rate of desertification. The process has been accelerated by unsupervised management and land use practices of overgrazing, cultivation and plowing of marginal soils and woodland removal in the high rainfall zones. The regions of irrigated highlands and the Jordan Valley were also affected by aspects of salinization and alkalinization of soil. In addition to human induced factors, climatic factors of irrational rainfall and periodic droughts are contributing to the problem. According to academic scientific assessments, the transition zone (between arid areas in the east and sub-humid areas in the west) has suffered from a high risk of desertification and is expected to lose its productivity over time.

On 21st October 1996, the Government of Jordan ratified the Convention to Combat Desertification, which entered into force on 16th December 1996. Jordan prepared and organised awareness campaigns and workshops to initiate the preparation of the National Action Plan.

The National Action Programme (NAP) to combat desertification was prepared in 2005 and officially launched in 2006. It includes six major programmes that are mainly "project-based". The programmes include several projects related to desertification monitoring and control, capacity building, natural resources rehabilitation and development. However, these programmes and the proposed projects provide framework for an action plan to combat desertification. The proposed programmes are the following:

1. Desertification Information System (DIS),
2. Drought prediction and desertification control,
3. Capacity building and institutional development,
4. Restoration of degraded ecosystems of rangelands and forests,
5. Watershed management, and
6. Human, social and economic development initiatives.

Each programme has several projects with justification, activities, implementing agencies and initial budget.

**National Priority Capacity Constraints in Implementing the UNCCD:**

The UNCCD stocktaking report identified the following national capacity constraints for implementation of the UNCCD:

1. Lack of a national land use plan and legislation
2. Desertification has little priority in the national development plans
3. Weak linkages between scientific research and policy making
4. Inadequacy of public awareness programs for various target groups on sustainable land management
5. Duplication and absence of roles and responsibilities of organizations working in land management
6. Absence of guidelines and specific directives for land management and rehabilitation in the EIA system
7. Weak capacity of local communities
8. Absence of a national database and system to monitor desertification
9. Lack of a mechanism to evaluate the impacts of economic and agriculture agreements on land management

10. Weak capacity for outreach and networking with regional and global organizations and programmes

**Climate Change in Jordan:**

As a country characterized with semi-arid climate, high dependence on rainfall and scarcity of water resources, Jordan is one of the countries to be highly affected with climate change impacts. Although Jordan's emissions of greenhouse gases are relatively very low, climate change is a big threat to Jordan since the ecosystem productivity and water resources are highly dependent on the hydrological cycle.

Jordan has ratified the UNFCCC in 1994 and the MoE became the national focal point for climate change issues and UNFCCC. Jordan started its efforts within the framework of the UNFCCC in 1996 with a GEF-UNDP supported programme for national capacity building in documenting national emissions of greenhouse gases and preparing Jordan's national communication to the UNFCCC. The first national communication was submitted in 1998 and it has been the first national communication to be prepared by a developing country party to UNFCCC. The national communication included an inventory of greenhouse gases' emissions from all sectors; energy, industry, transport, agriculture, institutional and residential.

The programme included developing national scenarios for greenhouse emissions for the upcoming 30 years based on various modeling systems. It has also included developing national mitigation measures for reducing the effects of climate change and a national action plan to reduce greenhouse emissions and turning into sustainable energy resources.

Based on this programme, a comprehensive assessment study was conducted in 1999 to anticipate the impacts of climate change on water resources in Jordan within the framework of vulnerability and adaptation to climate change. The study included four sectoral assessments on surface water, groundwater and wastewater in Zarqa basin and marine hydrological systems in the Gulf of Aqaba.

The MoEnv implemented between 2004-2006 the second phase of the capacity building programme under the title of "enabling activity" which included an inventory of current technologies. In 2006, the Ministry of Environment started preparing the Second National Communication (SNL) on greenhouse emissions that will also include suggested adaptation and mitigation measures for the first time in Jordan. The SNC project will develop and enhance national capacities to fulfill Jordan's commitments to the Convention on a continuing basis; enhance general awareness and knowledge of government planners on issues related to climate change and reduction of Greenhouse Gases(GHG) emissions, thus enabling them to take such issues into account in the national development agenda; and mobilize additional resources for projects related to climate change and mitigation of GHG; projects which may be eligible also for further funding or co-funding by GEF or other multilateral or bilateral organizations.

**Jordan and Kyoto protocol:**

Jordan ratified the Kyoto Protocol in 2003 to become only the third Arab country party to the Protocol.

A national committee was formed to develop project proposals and initiatives for the Clean Development Mechanism (CDM) of the Kyoto Protocol. The Protocol entered into force in February 2005 and Jordan has
started to mobilize resources under the CDM to implement the Protocol by developing three CDM projects and various projects are now within the CDM pipeline.

**National Priority Capacity Constraints for implementing the UNFCCC and Kyoto Protocol:**

The stocktaking exercise identified the following national capacity constraints for implementation of the UNFCCC and Kyoto Protocol:

1. Low capacity for developing National Vulnerability studies and Adaptation measures and guidelines
2. Lack of economic incentives for climate change mitigation and adaptation
3. Inadequate Institutional and technical capacity for the Climate Change focal point at the Ministry of Environment
4. Low Capacity for implementing the CDM
5. Weak linkages between research, systemic observation and policy making
6. Lack of a systemic approach to technology inventory and transfer
7. Lack of clear and systematic integration of the UNFCCC main concepts in the national policy formulation process
8. Weak systematic capacity development for energy efficiency
9. Weak capacity for practical education and training
10. Low capacity for Knowledge management and networking
11. Ineffective enabling environment for renewable energy
12. Low capacity for resource mobilization

# Chapter IV
# Progress towards the 2010 Target

**B Progress towards the Goals and Objectives of the Strategic Plan of the Convention**

**C Conclusions**

**An overall assessment of whether the implementation of the Convention has had an impact on improving conservation and sustainable use of biodiversity, and the fair and equitable sharing of benefits arising out of the utilization of genetic resources, in their country**

**An analysis of lessons learned regarding implementation, highlighting examples of successful and less successful actions taken**

**A summary of future priorities and capacity-building needs for further national-level implementation of the Convention**

**Suggestions for actions that need to be taken at the regional and global levels to further enhance implementation of the Convention at the national level,**

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- The Jordan Society for Sustainable Development http://www.jssd-jo.org

## Appendix 1
## Information concerning reporting Party:

**REPORTING PARTY**

| | |
|---|---|
| Contracting Party | JORDAN |
| **NATIONAL FOCAL POINT** | |
| Full name of the institution | ***The Ministry of Environment*** |
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| Full name of the institution | ***The Ministry of Environment*** |
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| **SUBMISSION** | |
| Signature of officer responsible for submitting national report | |
| Date of submission | ***30 March, 2009*** |

# Appendix 2

## PROCESS OF PREPARATION OF NATIONAL REPORT

The Ministry of Environment, through financial and technical support from GEF and UNDP was preparing the fourth National Report to be submitted to the Secretariat of the Convention on Biodiversity (CBD). The main theme of the 4th National Report is to assist Jordan with carrying out an initial assessment process with regards to applicable 2010 Biodiversity Targets at national level. Considering that the central theme of the fourth national report of the Convention on Biological Diversity is analysis of progress towards the 2010 Biodiversity Targets, the report format had been used for presenting this progress at national level.

Report preparation was in accord with COP decision VIII/14, and the CBD Secretariat notification 2006-083 Ref No. ITS/NR/LC/MC/55455, sent out to all Parties on July 28, 2006. Preparation of the report had using the guidelines and format provided at: http://www.biodiv.org/reports/guidelines.aspx .

A task force of National experts was formed to prepare a draft of the report in Arabic language which has been developed by November 2008. The draft report was discussed in a national workshop in November 2008 as a primary quality development exercise. The draft report had been further reviewed and edited in a professional and high quality manner and in full accordance with CBD guidelines. The fourth national is ready to be submitted to the CBD Secretariat before 30 March 2009.

The team consisted of representatives from Ministry of Environment (MoE), National Center for Agricultural Researches and Technology Transfer (NCARTT), private sector and a legal expert. Three national workshops were subsequently conducted to discuss the content of the draft report. Representatives from the following institutions participated in these workshops:

- Ministry of Agriculture
- Ministry of Environment
- Ministry of Water and Irrigation
- Ministry of Tourism and Antiquities
- Marine Science Station
- Royal Society for Marine life Protection
- Friends of Earth
- Jordan Society for Sustainable Development
-Jordan University for Science and Technology
- Yarmouk University

- University of Jordan
- National Center for Agricultural Researches and Technology Transfer
- Jordan Badia Research and Development Center
- Royal Society for the Conservation of Nature
-Jordan River Foundation
- Professional Consultants,

The outputs of the three national workshops were collected and incorporated in the draft report.

Finally, a committee was established to review and analyze the available data collected so far. Representatives from the following institutions participated :

- Ministry of Agriculture/ National Center for Agricultural Researches and Extension
- Ministry of Planning and International Cooperation
- Ministry of Environment
- Ministry of Tourism and Antiquities
- Royal Society for Conservation of Nature
- Professional Consultant.

This report represents the outcome of all mentioned efforts.

The basis of the report is several reports that have already been published and are publicly available. The most important among them are the Jordanian National Biodiversity Strategies and Action Plans, Environmental Strategy and National Environment Action Plan, National Sustainable Development Strategy, Agenda 21, the Forestry Development Plan, the Convention on Biological Diversity, Nature Conservation Development Plan, web-pages of Ministry of the Environment and Environment Information Centre, Jordan Country Study on Biological Diversity, 1998, and others.

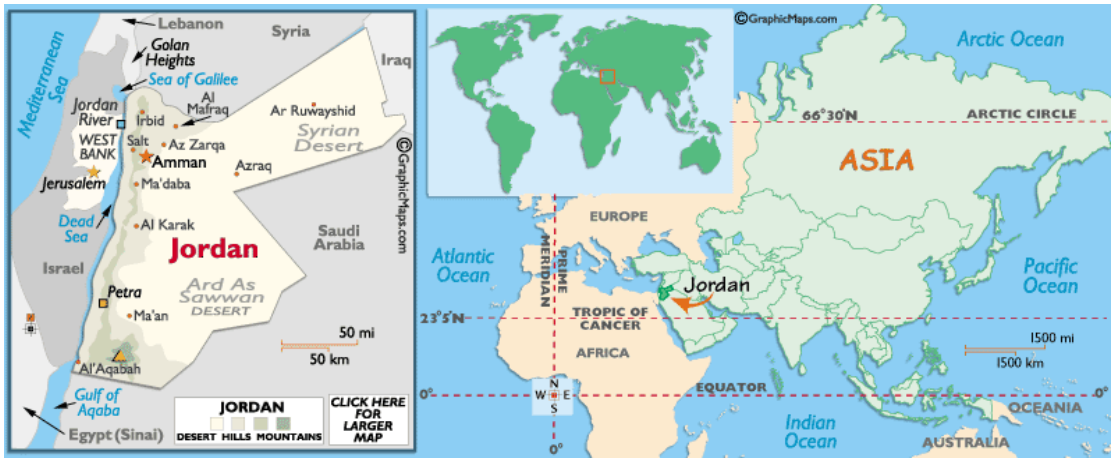
Each expert compiled its chapter or appendix. This text was discussed and revised in steering committee either in its meetings or electronically. Additionally, the report has been revised and commented by several officers and consultants through a workshop held in Amman 29/3/2009. Finally the report has been revised, commented, compiled and edited by Dr. Abdelmuti Tellawi, International Consultant, Biodiversity Strategy and Management, and Dr. Nidal Oran, Consultant, Environmental EIA.

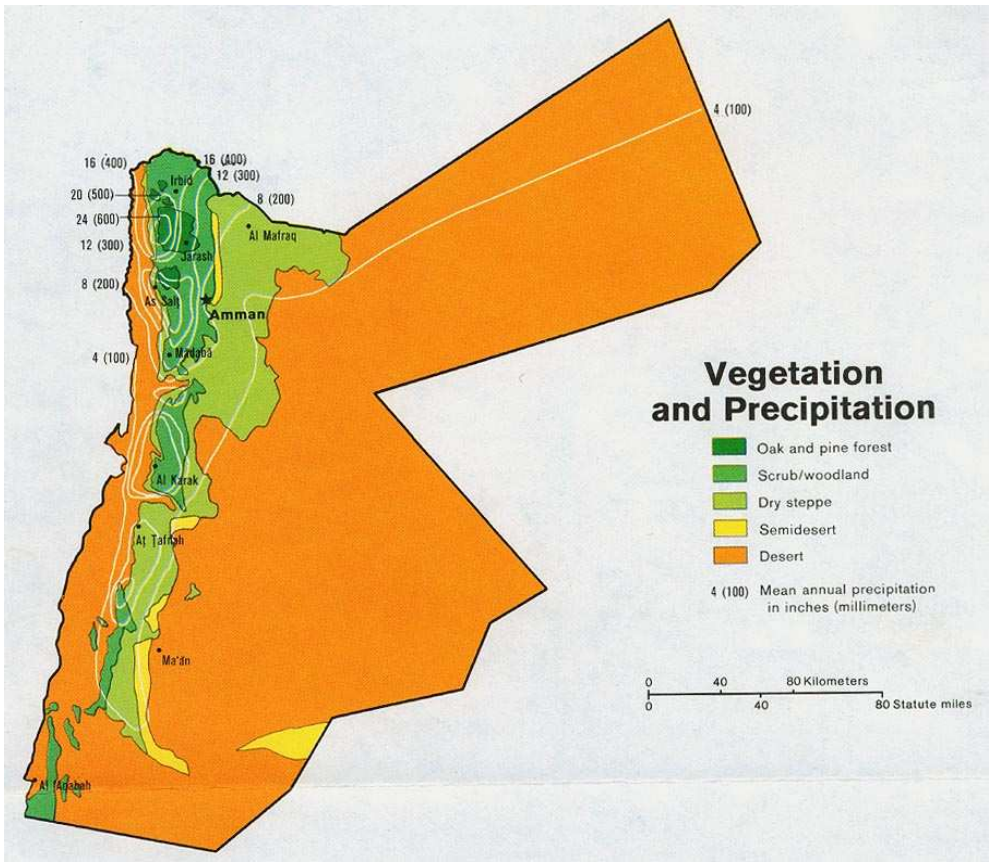
## Appendix 3.
## A Progress towards Targets of the Global Strategy for Plant Conservation

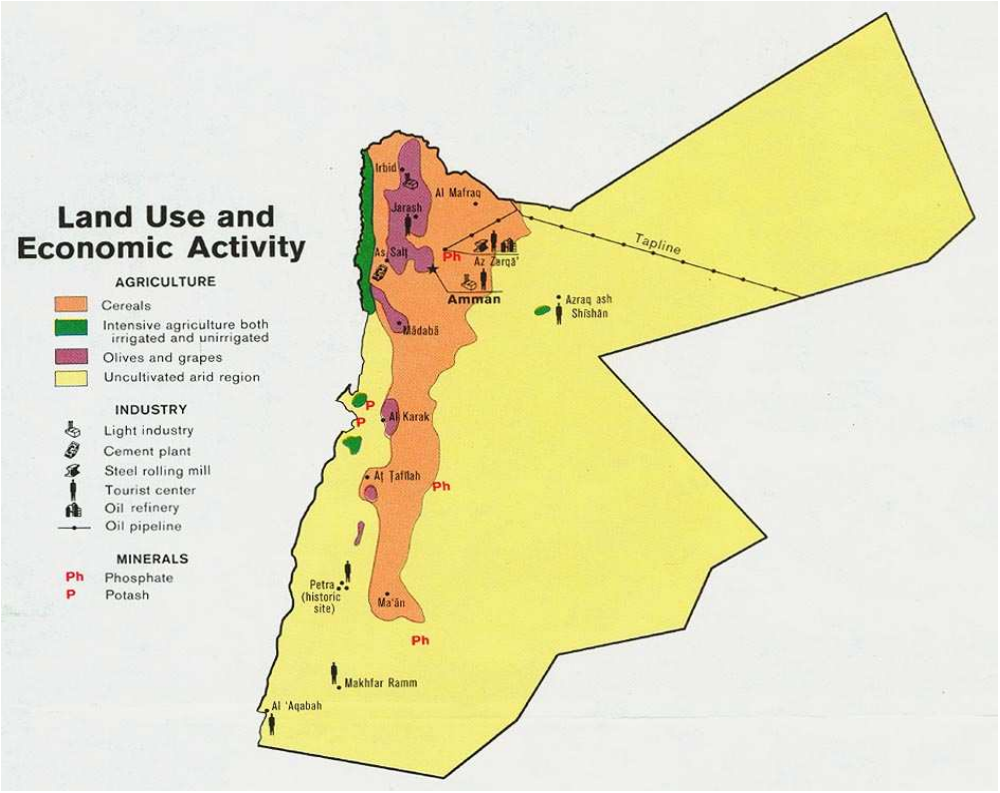
**B Progress towards Targets of the Programme of Work on Protected Areas**

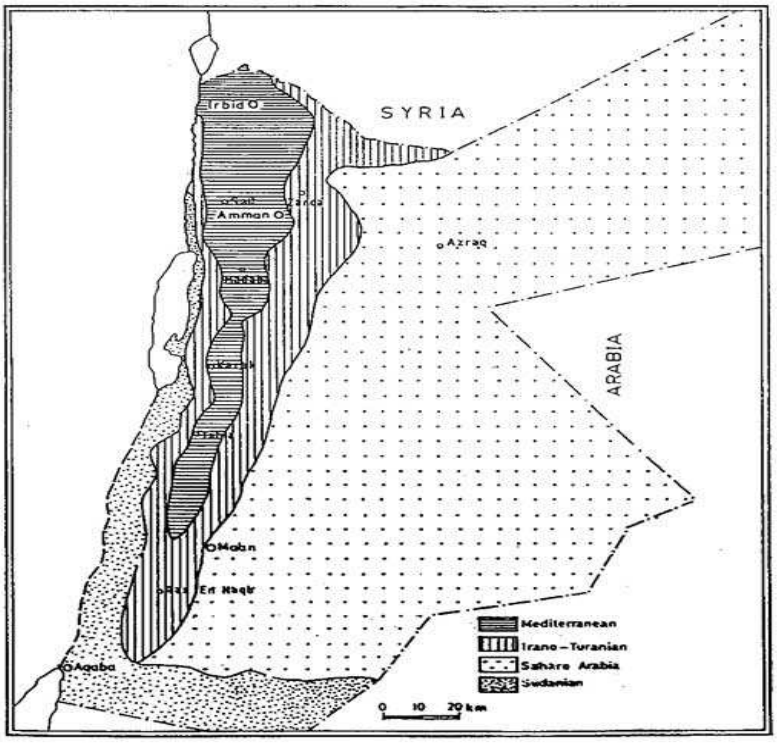
## Appendix 4
## National indicators used in the report

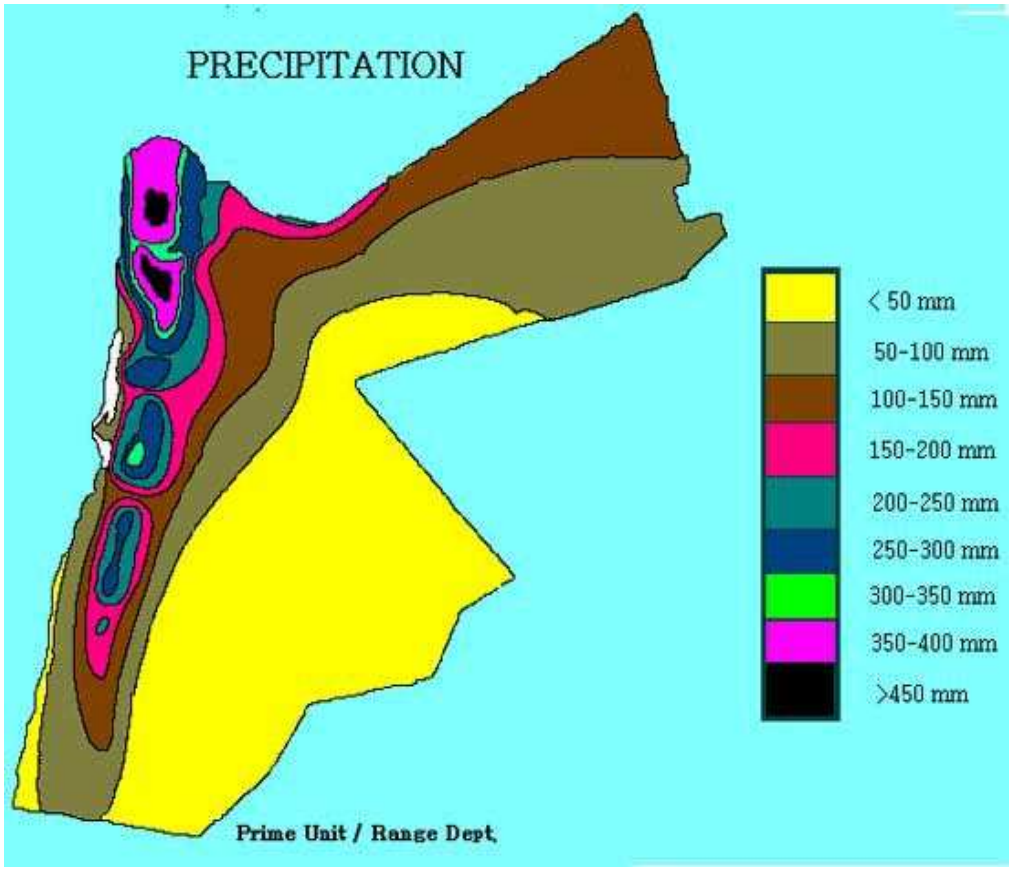

Lebanon
Syria
Iraq
Golan Heights
Sea of Galilee
Mediterranean Sea
Jordan River
Al Mafraq
Irbid
Ar Ruwayshid
Syrian Desert
WEST BANK
Salt
Az Zarqa
Amman
Azraq
Jerusalem
Ma'daba
Dead Sea
Al Karak
Jordan
Saudi Arabia
Israel
Ard As Sawwan DESERT
Petra
Ma'an
50 mi
50 km
Al'Aqabah
Gulf of Aqaba
Egypt (Sinai)
JORDAN
DESERT HILLS MOUNTAINS
©GraphicMaps.com

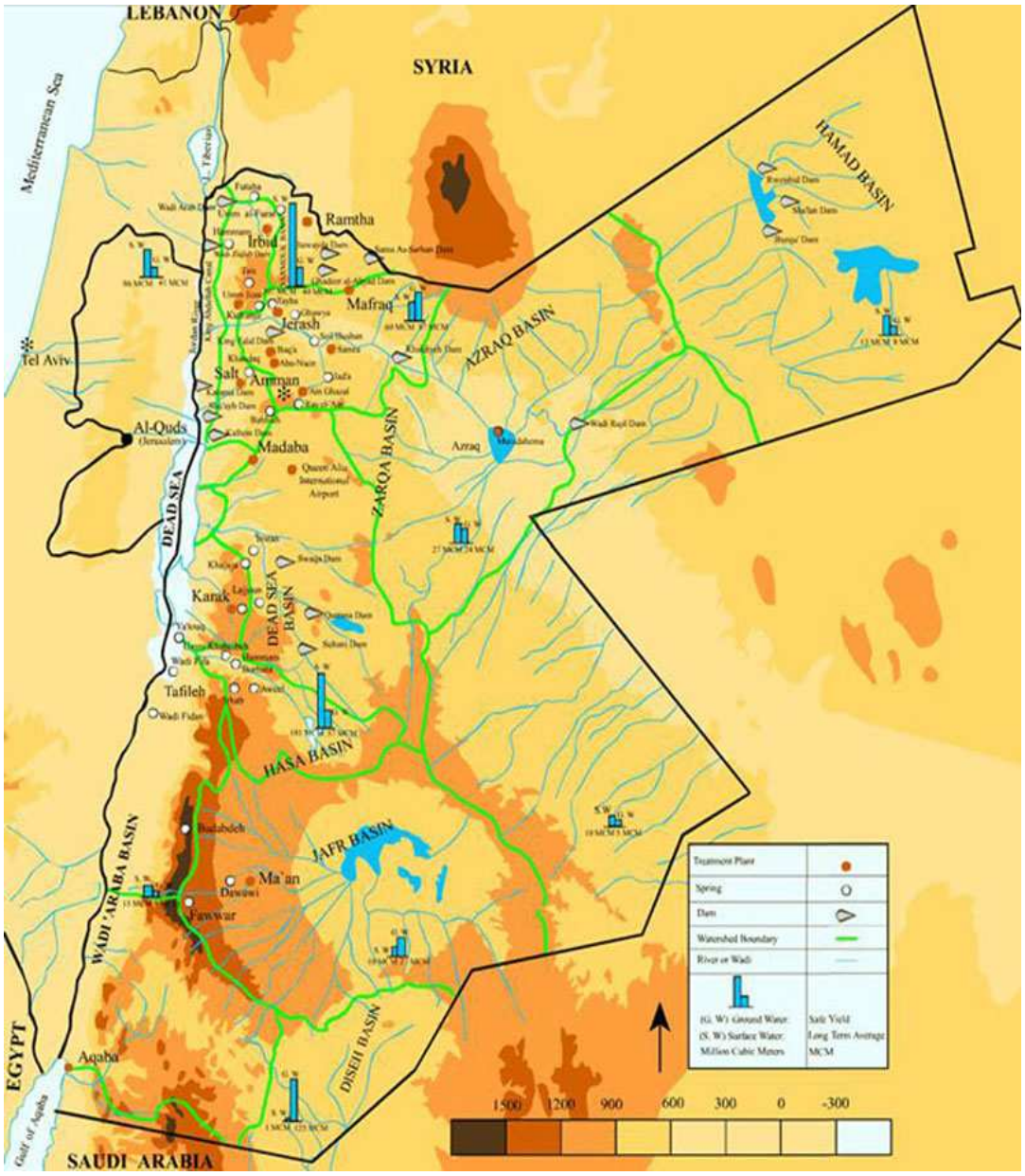

Lebanon
Syria
Iraq
Golan Heights
Sea of Galilee
Mediterranean Sea
Jordan River
Irbid
Al Mafraq
Ar Ruwayshid
Syrian Desert
WEST BANK
Salt
Az Zarqa
Amman
Azraq
Jerusalem
Ma'daba
Dead Sea
Al Karak
Jordan
Saudi Arabia
Israel
Petra
Ard As Sawwan DESERT
Ma'an
50 mi
50 km
Al'Aqabah
Gulf of Aqaba
Egypt (Sinai)
JORDAN
DESERT HILLS MOUNTAINS
CLICK HERE FOR LARGER MAP
©GraphicMaps.com
Arctic Ocean
66°30'N
ARCTIC CIRCLE
ASIA
EUROPE
Atlantic Ocean
PRIME MERIDIAN
Jordan
Pacific Ocean
23°5'N
TROPIC OF CANCER
AFRICA
1500 mi
1500 km
0°
EQUATOR
OCEANIA
Indian Ocean
AUSTRALIA


4 (100)
16 (400)
16 (400)
12 (300)
20 (500)
8 (200)
24 (600)
12 (300)
Irbid
Al Mafraq
Jarash
8 (200)
As Salt
Amman
4 (100)
Madaba
Al Karak
At Tafilah
Ma'an
Al 'Aqabah
Vegetation and Precipitation
Oak and pine forest
Scrub/woodland
Dry steppe
Semidesert
Desert
4 (100) Mean annual precipitation in inches (millimeters)
0 40 80 Kilometers
0 40 80 Statute miles


Land Use and Economic Activity
AGRICULTURE
Cereals
Intensive agriculture both irrigated and unirrigated
Olives and grapes
Uncultivated arid region
INDUSTRY
Light industry
Cement plant
Steel rolling mill
Tourist center
Oil refinery
Oil pipeline
MINERALS
Ph Phosphate
P Potash
Irbid
Al Mafraq
Jarash
As Salt
Az Zarqā'
Amman
Tapline
Azraq ash Shīshān
Mādabā
Al Karak
Aṭ Ṭafīlah
Petra (historic site)
Ma'ān
Makhfar Ramm
Al 'Aqabah


SYRIA
Irbid
Amman
Azraq
ARABIA
Mediterranean
Irano-Turanian
Sahara Arabia
Sudanian
0 10 20 km


PRECIPITATION
< 50 mm
50-100 mm
100-150 mm
150-200 mm
200-250 mm
250-300 mm
300-350 mm
350-400 mm
>450 mm
Prime Unit / Range Dept.


LEBANON
SYRIA
Mediterranean Sea
HAMAD BASIN
Ramtha
Irbid
Mafraq
Jerash
AZRAQ BASIN
Tel Aviv
Salt
Amman
Al-Quds
(Jerusalem)
Madaba
Azraq
DEAD SEA
ZARQA BASIN
Karak
DEAD SEA BASIN
Tafileh
HASA BASIN
Batabdeh
JAFR BASIN
WADI 'ARABA BASIN
Ma'an
Fawwar
Aqaba
DISEIH BASIN
EGYPT
Gulf of Aqaba
SAUDI ARABIA
Treatment Plant
Spring
Dam
Watershed Boundary
River or Wadi
(G. W) Ground Water
(S. W) Surface Water
Million Cubic Meters
Safe Yield
Long Term Average
MCM
1500
1200
900
600
300
0
-300