

## C. Country Analysis Requirements – Biodiversity and Tropical Forests Analysis

### Biodiversity in Jordan

The biogeography of Jordan exhibits pronounced regional differentiation due to climatic variation, diverse geography, and the intersection of three distinct faunal elements: the Ethiopian, Oriental, and Palearctic. The result is a surprising diversity of wildlife in Jordan, despite its relatively small size. Nonetheless, the total number of species is limited and remains vulnerable to land use impacts of development and the stresses from living in a predominantly arid and desert environment. The lack of natural barriers between Jordan and surrounding countries allows animals to move fairly freely from one country to another. Consequently, there are relatively few species that are considered “endemic” and only found in Jordan.

Jordan has a rich and highly diverse vascular flora, 2,500 species included within 152 families and 700 genera. Jordan has 1 percent of the total world flora represented within its boundaries. No serious study to identify endemic, rare, and endangered species has been carried out in Jordan. Species known to be rare or endangered include orchids, ornamental bulbous plants, and some rare edible and medicinal plants. Since agriculture and cereals evolved in this part of the world, Jordan is rich in crop genetic resources.

Many species of wildlife in Jordan are considered globally threatened and 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 high, especially in mammals, where 24 of 77 mammals are considered threatened. Sixteen of 419 species of birds are considered threatened. The decline in Jordan’s wildlife is affecting other taxonomic groups as well. Five reptiles, six freshwater fish, two marine invertebrates, and four marine vertebrate species are threatened.

Plant diversity in Jordan is facing a dramatic decline and some species have become extinct in the wild since the early part of this century. Key factors driving this decline include the loss and degradation of habitats, over-exploitation of plant and animal species, extensive agricultural and uncontrolled development, overgrazing, introduction of invasive species, illegal collection of plants, and depletion of major water sources. The Royal Society for the Conservation of Nature (RSCN) lists 100 endemic species of plants, 200 to 250 rare species, 100 to 150 threatened species, and 10 to 20 species that have gone extinct over the past 90 years.

Jordan’s primary biodiversity conservation efforts are not focusing on a relatively few endemic species, but rather on the diversity of dryland habitat. The global conservation community is becoming increasingly concerned with dryland biodiversity and the benefits of its conservation and management. Jordan, situated at the center of this unique biota in the Middle East, represents both a challenge and opportunity for conservation and management of dryland.

### Forest Resources

Jordan’s forests cover less than 0.9 percent of the total area and are restricted to the higher, better watered scarp and highland ecosystems. This area contains Mediterranean woodlands of oak (*Quercus coccifer* and *Q. aegilops*) and pine (*Pinus halapensis*), with Juniper and cypress occurring more locally. These woodlands are believed to have originally covered large tracts of the Jordanian highland, but millennia of human occupation and natural climatic change have resulted in dramatic deforestation and replacement of natural vegetation with secondary species. Woodlands today cover only about 100,000 ha.

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

Jordan's forests play a key role in the maintenance of biodiversity, providing shelter for a diverse array of birds, plants, insects, and animals. Jordan's forests have an estimated 250 rare plant species, of which 150 are endangered. These forests are under great pressure due to inadequate management and protection, fires, wood collection and charcoal production, encroachment of agricultural land, and overgrazing with consequent soil degradation and erosion.

### **Rangeland Resources**

Rangelands receiving less than 200 mm average rainfall per year cover 91 percent of the country and include Badia, steppes, and parts of the Jordan Valley. Rangelands provide animal feed at little or no cost. Grazing is a way of life and source of income for a large number of the inhabitants of these areas. Traditional grazing cycles were based on a transhumant system that allowed for the natural regeneration of forage. This situation no longer exists and traditional grazing rights are mostly ignored. Overgrazing, uprooting of range plants, off-road driving, improper cultivation patterns, and urbanization are degrading rangelands.

The government has recognized for many years the importance of rangelands and the need for their sustainable management. The first range reserves were established in the 1940s to protect, improve, and manage rangelands through research and development activities. Currently, there are 27 rangeland reserves covering a total area of about 0.8 million hectares and nine cooperative range reserves covering 0.1 million hectares.

### **Coastal and Marine Resources**

Coastal habitats are often subjected to great pressure for development. This is particularly true for Jordan, whose small coast provides strategically important access to the sea for shipping and industrial development, as well as for supporting recreation and tourism.

The Jordanian coastline stretches along about 27 km of the most northern tip of the Gulf of Aqaba. The Gulf is characterized by its great depth in proportion to its width, its transparent, oligotrophic water due to the absence of rivers or major streams flowing into the Gulf, and its fringing reefs. Along Jordan's coast, there is a discontinuous series of fringing reefs, never more than 150 meters wide, over a length of 13 km. These are found mainly around headlands, and are separated by bays, usually with sea grass beds, which correspond to the mouths of dry wadis.

The coral reef and marine environment of the Gulf of Aqaba support around 1,000 species of marine fish, 5 percent of which are endemic. Many of these species, especially those that are migratory, are of high economic value, such as the tuna and sardine that enter the Red Sea and reach the Gulf of Aqaba. The fringing reefs in the Gulf of Aqaba represent the northern limit for reefs in the Western Indo-Pacific region. The corals comprising these reefs are remarkably diverse. Over 250 different species of coral and other invertebrates occur, some of which are globally endangered, such as species of red and black corals.

### **Freshwater Ecosystems (Wetlands)**

Azraq oasis (a RAMSAR site) is the only large wetland in Jordan. There are smaller wetland areas that are important for migrating or over-wintering waterfowl. These occur in five main areas: (1) the North Jordan Valley, (2) the Middle Jordan Valley, (3) the South Jordan Valley, (4) seasonal marshes and mudflats in the eastern desert such as the Disi area, Qaa Khana, Qaa Burqu (permanent pond) and Jafr, and (5) the Gulf of Aqaba.

Jordan lies on the major migratory route of north Palearctic waterfowl. Over the past few years the drying of the Azraq oasis has caused the majority of migrating waterfowl to be shifted to the Jordan Valley, which gives it a crucial role in avian conservation.

Jordan's wetlands vary from salt marshes, estuaries, and permanent small water bodies to manmade water reservoirs and sewage treatment plants. Any water body in such a semiarid and desert environment is of great importance for the survival of migrating waterfowl. However, all water bodies in Jordan are viewed as a source of water for urban, industrial, and agricultural uses. Many water bodies are affected by increasing salinization, pollution, and eutrophication due to intensive agricultural practices. Many aquatic species are at the edge of extinction if not already lost in Jordan. Seasonal marshes in the Disi and Jafr areas are deteriorating due to seasonal cultivation of barley and wheat.

### **Major Threats to Biodiversity**

Jordan's terrestrial, aquatic, and marine biodiversity is under severe threat from habitat destruction. A number of species have already vanished in the wild, including the Arabian Oryx (*Oryx leucoryx*), Syrian wild ass (*Equus hemionus*) roe deer (*Capreolus capreolus*), and the Syrian brown bear (*Ursus arctos syriacus*). Others are under severe threat and moving towards extinction, such as the Nubian ibex, goitered gazelle, Persian squirrel, and birds such as the houbara bustard, Black-bellied Sandgrouse, and Sand partridge.

### **Agents of Change**

The most significant factors contributing to the decline are overgrazing and plant cover destruction, illegal hunting and wildlife trade, urban development and expansion, inappropriate agricultural practices including pesticide use and fire, introduction of alien and invasive species, lack of adequate legislative policies for protected areas, and lack of environmental awareness. Habitat conversion to agriculture, deforestation, and urban expansion are major problems that put increasing pressure on remaining wildlife resources. Overgrazing of marginal environmental systems is a leading cause of habitat degradation and species extinction. Urbanization has a significant impact on remaining forested areas. The spread of housing in zones adjacent to forests have led to the movement of urban areas into forested zones.

Unregulated water use and development also pose severe threats for environmental systems. Over pumping of groundwater has caused shrinkage of the Azraq Oasis, which was designated a RAMSAR site in 1977. Efforts to restore water to the oasis have led to a partial recovery, but its long-term viability is still questionable.

### **Over-Harvesting and Trade in Plant and Animal Species**

Poaching and illegal trade in wildlife and plants have emerged in recent years as major drivers of local and regional decimation and extinction of wildlife species. The pet and aquarium trade, trophy, specimen, and biological curio markets are driving burgeoning domestic and international markets for Jordan's wildlife and plant species. The Jordanian Convention on International Trade in Endangered Species (CITES) management authority faces considerable challenges in regulating and controlling wildlife trade. Trade is known to occur in local, rare and endangered large mammals listed in CITES appendices, such as Nubian ibex (*Capra ibex nubiana*), dorcas gazelle (*Gazella dorcas*), Arabic gazelle (*Gazella gazella*) goitered gazelle (*Gazella subgutturosa* spp.), Eurasian badger (*Meles meles*), fennec (*Fennecus zerda*), Egyptian mongoose (*Herpestes ichneumon*), Persian squirrel (*Sciurus anomalus*), and others. Illegal trade is also occurring in reptiles, particularly in spiny-tailed lizard (*Uromastix aegyptia*) and desert monitor (*Varanus griseus*); and in raptors (*Falco naumani*, *F. cherrug*, and others).

Jordan is actively screening the wildlife trade, and authorities regularly confiscate endangered wildlife. However, a particular concern related to CITES enforcement in Jordan is the lack of adequate legislation and clear delineation of lines of responsibility. Other major constraints to CITES enforcement include inadequate public awareness in Jordan and other Middle Eastern countries towards the critical importance of CITES in species conservation; shortage of in-country expertise and human resources to enforce CITES regulations; insufficient financial resources and

training to follow up and manage the CITES Convention in Jordan; and lack of resources for rehabilitation of confiscated species and reintroduction to their natural habitats.

### **Illegal Hunting**

Illegal hunting is a major reason for the continuing decline of wildlife in Jordan. Many of the country's most beautiful animals like the Arabian Oryx, the leopard, and the mountain gazelle, are now extinct because of excessive hunting pressure. Responsibility for enforcing hunting regulations is delegated to the RSCN, under the Agricultural Law, but RSCN has only budgeted for five rangers to patrol the country. While the rangers have been remarkably effective given the size of their force, they are an inadequate solution to the problem. RSCN has recently started a new initiative to develop a working relationship with the Jordanian police that will help create a nationwide enforcement network better equipped to control illegal hunting over the long-term.

### **Legislative and Policy Environment**

The Ministry of Environment (MoEnv) was established in 2003 under an amendment to the Environmental Protection Law No. 12 of 1995, the principal legislation governing environmental protection in Jordan. The Environment Law established the General Corporation for the Environment Protection (GCEP) and outlined the agency's responsibilities and authorities. Article 4 described the mission of GCEP to "promote protection of the environment and the improvement of its various elements and the execution of this policy in co-operation with relevant authorities." The bylaw on Natural Reserves and National Parks No. 25 for the year 2005 deals directly with the conservation and management of biodiversity. In 2003, the MoEnv prepared the National Biodiversity Strategy and Action Plan. The management of natural reserves was delegated to the RSCN, and the enforcement of legislation is managed by the Directorate of Monitoring and Enforcement at the MoEnv in close cooperation with the Environmental Police Directorate (currently known as the Royal Directorate for Environment Protection).

### **Protected Areas, National Parks and Reserves**

Situated at the intersection of three biogeographical zones – the Mediterranean, oriental and afro-subtropical – and acting as a floral and faunal bridge and migratory pathway, Jordan possesses a diverse array of habitats, biomes, and species. Given increasing pressures on this fragile habitat, the establishment of an effective system of parks, reserves, and protected areas is an urgent priority.

A report on key habitats specified their geological, ecological, hydro-biological characteristics and biodiversity. The report recommended the establishment of a network of 12 wildlife reserves to be managed by the RSCN. Six are now established and managed by RSCN. Six other sites of conservation importance were identified in 1998. RSCN also identified 27 important bird areas, 13 important wetland areas, marginal land at national borders (protected by the Jordanian army), and wildlife corridors of significant conservation importance due to their great diversity of species and habitats.

Jordan has responded to the need to conserve its wildlife and natural habitats by developing a system of protected areas, consisting of 23 forest and rangeland reserves, seven wildlife reserves (and nine proposed sites), one marine reserve in the Gulf of Aqaba, and eight national parks, with a combined area of over 300,000 hectares, more than 3.4 percent of the land of Jordan. Management of these reserves falls under the jurisdiction of a variety of government agencies and the RSCN.

Although forest and rangeland reserves are shown on maps as protected areas, they continue to suffer overgrazing, wood and plant collection, and illegal hunting because legislative measures for their protection are inadequate. Management Plans were prepared for most of the established reserves while management plans for the remaining reserves are underway.

The Dibbin and Zai national parks are of special ecological importance and are under RSCN and Salt Municipality management, respectively. **The Dibbin National Park** contains the most southern distribution of Aleppo pine in the world and it provides an important habitat for a diverse array of flora and fauna, making it one of Jordan's most important protected areas for biodiversity conservation.

### **Jordan's Participation in Multilateral Conventions**

Jordan is a signatory and participant in a number of international conventions that impact biodiversity conservation. Although most of these agreements require action from the participating country, Jordan is currently challenging the terms of implementation espoused in these agreements.

### **NGO Activities**

Jordan's environmental NGOs have made particularly important contributions in biodiversity conservation. For example, the RSCN is an NGO with about 350 employees, around 100 in Amman and the remainder in the governorates. RSCN manages six nature reserves on government land (Shaumari, Azraq, Mujib, Dana, Ajloun, and Dibbin) and has the mandate to enforce hunting laws and issue hunting licenses. One of its oldest programs is captive breeding of endangered species and their reintroduction to the wild, including the Arabian Oryx, gazelle and ibex. It is important to note that these programs have all graduated in all protected areas and the Shaumari reserve has become a nature reserve with high educational function.

The RSCN effectively advocates for the areas they manage and uses the Environmental Impact Assessment process to challenge government programs that could have negative impacts on the areas they manage. Their environmental education program, in cooperation with the MOE, centers on the more than 1,000 nature clubs in schools across Jordan, using the network of nature reserves as outdoor training centers for environmental education programs.

Birdlife International, a global alliance of national conservation organizations, is working in Jordan to conserve birds, their habitats, and global biodiversity. The alliance works with people for sustainable use of natural resources. Working through RSCN, the alliance is supporting a study of migratory bird pathways in Jordan to identify important areas for conservation action.

The International Union for the Conservation of Nature (IUCN) established a regional office in Amman in 2003 under a bilateral cooperation agreement with the MoEnv. The office is supported by a national committee and includes several technical programs, including a regional program on drylands and water and another on protected areas and natural resources management. The office engages in several key projects in Jordan with focus on water basins management (including Zarqa and Azraq) as well as cooperation with several national institutions on biodiversity related programs.

A number of Jordanian NGOs are engaged in public awareness and outreach. The Jordan Environment Society (JES), founded in 1988, currently has 24 branch offices and 6,000 members. Funding has been secured primarily from international donors, including Germany, USAID, and the Arab Fund for Social and Economic Development. JES is currently supporting programs aimed at environmental protection and awareness, including campaigns on integrated pest management, water conservation, and solid waste management.

Friends of the Earth (FOE) was established in 1994 and now maintains a small full-time staff and a network of volunteers. With support from member companies and international donors, FOE has extensive programs in environmental education, including the GLOBE program to link students and researchers worldwide in the collection of environmental data.

Friends of the Earth – Middle East (FOEME) is a regional NGO with programs in Jordan, Palestine, Israel, and Egypt. Through its international water programs, FOEME works in Aqaba to reduce the use of plastic, which is a significant source of pollution on coral reefs. FOEME is advocating that the Dead Sea be declared a Biosphere Reserve and World Heritage Site.

The Jordan Society for the Protection of Marine Environment (JREDS) was established in 1994 with a mission to conserve, rehabilitate, and enhance the marine environment in the Gulf of Aqaba. JREDS uses a number of tools to achieve its goal, including: grassroots participation, lobbying, raising public awareness, and developing local technical capabilities. Programs include beach and marine clean-up, crown-of-thorns control and encouraging fishermen to identify alternatives to fishing on the reefs.

### **USAID/Jordan Activities in Biodiversity**

USAID/Jordan has been providing assistance to the GOJ to address environmental issues and protect Jordan's biodiversity. In October 2008, USAID signed a Memorandum of Understanding with the MoEnv formalizing the strong working relationship between the two entities and setting the scene for future planned U.S. assistance to Jordan in the field of environmental protection and the promotion of sustainable environmental management. USAID/Jordan activities in biodiversity include:

- Promoted sustainable development activities in the Dana Biosphere Reserve, such as ecotourism and organic farming, including helping to build a bridge between nature conservation and the socioeconomic needs of local communities.
- Eco-tourism –
  - Supported RSCN in building nature lodges in the Aqraq Oasis and Wadi Feynan (the western gateway of the Dana Nature Reserve), and establish the Amman Nature Center (“Wild Jordan”) through a \$4.5 million grant and a \$7 million endowment from the local currency program. The Nature Center provides a unique environmental education center for Jordanians and international visitors and provides a marketing outlet for RSCN nature products and services. The grant also supported a small business program, with several new or modified product lines introduced to sales outlets, including reed toys, olive oil soap, embroidered bags, and t-shirts.
  - Supporting RSCN, through a 5-year \$8.3 million grant, in creating a world class nature-tourism hub in southern Jordan, centered in the new protected area of Jebel Masada and radiating outwards to the established protected areas of Dana, Feynan and Petra. The project will help restore and sustain use of ancient Rift Valley villages, involve local communities in development and site protection, engage the private sector and private investment in eco-tourism development, and pioneer the use of economic incentives as pathways for the effective protection of critically important ecosystems.
- Protection of Nature Reserves –
  - Promoted sustainable development activities in the Dana Biosphere Reserve, such as ecotourism and organic farming, and helped build a bridge between nature conservation and the socioeconomic needs of the local community.
  - In partnership with the U.S. Department of Interior, USAID helps to build the capacity of protected parks managers and Royal [Environmental] Rangers for enhanced protection of Jordan's environmental, natural and cultural resources. USAID's Jordan Tourism Development Project is also supporting the certification and development of procedural guides for improved environmental practices within tourism establishments.
- Aqaba – Supported the establishment of the Aqaba Special Economic Zone in January 2001 as a regional hub for investment and tourism in the southern port city of Aqaba. The natural environment of the Aqaba region is an important resource, and the base upon which future development depends. USAID/Jordan is building the capacity of the Aqaba Special Economic Zone Authority (ASEZA) to develop Aqaba's resources in a sustainable way.

USAID has helped build ASEZA's capacity for environmental management, including its capacity to manage the Aqaba Marine Park and the Wadi Rum Area, and its capacity to monitor water quality and wastewater reuse to protect the marine environment.

- Marine Life – Helped create the Aqaba Marine Park to protect the coral reefs and ecosystems in the area, and developed the Red Sea Marine Peace Park Cooperative Research, Monitoring and Management program. USAID also supports the Royal Ecological Diving Society (JREDS) in their efforts to increase awareness on marine environment, enhance marine zone economic development, and conduct Red Sea ecological research.

### **Other Major Donor Activities**

The Global Environmental Facility (GEF) has provided funding for the following biodiversity programs in Jordan:

- Rehabilitation of Dana and Azraq Oasis and the institutional strengthening of RSCN. The project included the completion of comprehensive ecological surveys, establishment of a management plan, environmental assessment of impacts affecting the Oasis, and promotion of sustainable development. The project developed a management plan for the reserve, has reduced groundwater extraction, and encouraged recycling of water into the ponds and marshes of this threatened wetland.
- Aqaba Marine Coastal Management and Establishment of Aqaba Marine Park project was implemented in cooperation with the Aqaba Regional Authority, the GEF, and the EU. The project established Jordan's first marine reserve for promoting the conservation of marine biodiversity, established a coastal management and development plan, and strengthened the capacity of the Aqaba Regional Authority environmental unit.
- The Dibbin Protected Area (DPA) project, a one million dollar project aimed at establishing the Dibbin National Park and its corresponding management plan. The DPA also promotes alternative livelihoods that utilize ecotourism with a focus on domestic tourism and recreation.

The GEF small grants program has also been active in Jordan for over a decade and has provided substantial funding for locally driven initiatives under the themes of biodiversity, land degradation, international waters and climate change. To date, there are over 130 projects throughout the country, all managed by local CSOs.

UNDP provided support to Jordan's preparation of a national Agenda 21 report, encouraged participatory planning and helped build public awareness about environmental problems and sustainable development. The World Bank is supporting the development of a series of comprehensive management and tourism development plans for key parks, such as the Petra National Park, which will emphasize conservation and management of natural, cultural, and human resources. The Government of Japan bilateral assistance program provided \$100,000 to enhance ecotourism in the Ajloun forest reserve. The grant will help refurbish the visitor center and provide a campsite to promote nature-based tourism. The Swiss Agency for Development and Cooperation provided a grant to support the socioeconomic development of Wadi Mujib.

The World Bank has also provided funding for the project entitled Integrated Ecosystem Management in the Jordan Rift Valley in the amount of USD \$ 6.5 million. The project aims to lay the groundwork for integrated ecosystem management in the JRV by introducing biodiversity conservation and community participation measures into the existing land use planning framework, using the proposed protected areas (PAs) and Special Conservation Areas (SCAs) as pilot sites. The anticipated results and outcomes of the project over its six years of implementation are:

- Consultative planning and management procedures involving all relevant stakeholders, and based on IEM principles, successfully introduced to the Rift Valley to support the conservation of key biodiversity sites.
- A network of four PAs (c. 57,000 ha) and seven SCAs in the JRV that are legally established and operate as models of IEM principles to support biodiversity conservation.
- Elements for 'climate proofing' biodiversity conservation within PAs and SCAs introduced into the conservation planning and implementation stages of the project.
- Sustainable financing mechanisms for PAs strengthened through increased capitalization of \$2 million for the endowment fund, and adoption of economically viable, nature-based livelihood options by local communities in PAs and SCAs.

## **Conclusions**

There are many constraints and opportunities within the biodiversity sector in Jordan. During the proposed Mission strategy period of 2009-2014, the Mission will continue to focus on improving water resource management, improving health and family planning, improving education, increasing economic opportunities for Jordanians, promoting energy conservation, and increasing good governance and civic participation. Although not directly addressing biodiversity conservation, Mission programs will continue to include support for activities that improve environmental management capacity, in turn protecting natural resources and sustaining economic growth. In terms of what is needed to conserve terrestrial, aquatic, and marine biodiversity in Jordan, the following recommendations will be addressed in part by USAID activities under this Mission strategy:

1. Establish an effective legal and regulatory framework for environmental management and clarify overlapping institutional mandates, authorities, and arrangements.
2. Establish an effective network of protected areas to safeguard a representative sample of major and key ecosystems.
3. Build environmental management capacity and foster integrated land-use planning
4. Promote public awareness and expand environmental education.
5. Promote investment in ecotourism development as a growing engine of economic development with focus in and around conservation hot spots while linking it to sustainable local livelihoods development.
6. Promote improved governance types of natural resource management with particular focus on local communities' empowerment and participation with equitable benefit sharing.
7. Support the completion and maintenance of the national Protected Area network within the principles of ecosystem management.
8. Prevent overgrazing by livestock and improve range management.
9. Strengthen law enforcement to reduce illegal hunting, trade in endangered species, and other wildlife crime.
10. Stop illegal woodcutting and encroachment of urban settlement into woodlands through technical and hardware assistance support of the law enforcement body represented by the MoEnv staff and the Royal [Environmental] Rangers.
11. Assist in capacity building of the new MoEnv and other associated national civil society organizations.