



THE HASHEMITE KINGDOM OF JORDAN



MINISTRY OF WATER & IRRIGATION

JORDAN VALLEY AUTHORITY



**UNITED STATES AGENCY
FOR INTERNATIONAL DEVELOPMENT (USAID)**

Jordan Valley Preliminary Land Use Master Plan Project

**Environmental Assessment, Dead Sea Carrying Capacity
and Archaeological Assessment**

Volume 4 of 5

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Acronyms Or Abbreviations

AMIR	Achievement of Market Friendly Initiatives and Results Program
a.s.l	Above Sea Level
b.s.l	Below Sea Level
BMPs	Best Management Practices
CC	Consolidated Consultants Engineering & Environment
CDG	Community Development Group
CIDA	Canadian International Development Agency
CMI	Chesrown Metzger International
CSBE	Center for the Study of the Built Environment
DOA	Department of Antiquities
DOS	Department of Statistics
EA	Environmental Assessment
EIS	Environmental Impact Statement
EU	European Union
FOE	Friends of the Environment
FoEME	Friends of the Earth Middle East
FTA	Free Tourism Area
GIS	Geographic Information System
GTZ	German Aid Agency
IBA	Important Bird Area
IUCN	International Union for the Conservation of Nature
JEPAFV	Jordan Exporters and Producers Association for Fruits and Vegetables
JES	Jordan Environment Society
JIB	Jordan Investment Board
JSDCBD	Jordan Society for Desertification Control and Badia Development
JTB	Jordan Tourism Board
JVA	Jordan Valley Authority
JVA IAS	Jordan Valley Authority Irrigation Advisory Service Unit
KAC	King Abdullah Canal
KAFA'A	Knowledge and Action Fostering Advances in Agriculture
KTD	King Talal Dam
LRD	Department for Lands and Rural Development
MCM	Million Cubic Meters (water)
MJVSA	Middle Jordan Valley Study Area
MOA	Ministry of Agriculture
MOE	Ministry of Environment
MOP	Ministry of Planning
MOT	Ministry of Transport
MOTA	Ministry of Tourism and Antiquities

MPWH	Ministry of Public Works and Housing
MWI	Ministry of Water and Irrigation
NCARTT	National Center for Agricultural Research and Technology Transfer
NTSI	National Tourism Strategy Initiative
NEAP	National Environmental Action Plan
NEF	Near East Foundation
NGO	Non-governmental Organization
NJVSA	Northern Jordan Valley Study Area
QIZ	Qualified Industrial Zone
RSCN	Royal Society for the Conservation of Nature
RSDS	Red Sea to Dead Sea Canal or Pipeline Project
SJVSA	Southern Jordan Valley Study Area
SWOT	Strengths, Weaknesses, Opportunities and Threats
TFR	Total Fertility Rate
UFW	Unaccounted for Water
USAID	United States Agency for International Development
WAJ	Water Authority of Jordan
WCA	Water Conservation Association
WTO	World Tourism Organization

1 PROJECT GOALS AND OBJECTIVES

The Jordan Valley is Jordan's premier agricultural production area. The mild winters in the valley, which are due to the predominant below-sea-level (b.s.l.) elevations, provide great potential as a natural greenhouse for the production of high-value off-season fruits and vegetables. In addition to the significant agriculture, the Jordan Valley, including the Dead Sea, contains environmentally sensitive ecosystems and coastline, industrial areas, human settlements, and important cultural and natural sites which should be protected and linked for tourism development. These geographic areas are important to the creation of sustainable economic opportunities for Jordan and the region.

The Jordan Valley Authority (JVA) requested assistance to undertake work identified in the Regional Land Use Planning and Land Management Strategy for the Jordan Valley Authority. The United States Agency for International Development (USAID)/Jordan Water SO Office has indicated that it will assist the JVA in the development of a preliminary land use master plan for tourism and commercial/industrial purposes.

The main objectives of the project include:

- 1- Assisting Jordan Valley Authority in physical land use planning needs for the 3 identified zones in the project area; Zone 1: Yarmouk River to the Baptism Site, Zone 2: the Dead Sea area, and Zone 3: the Southern Ghors and Wadi Araba;
- 2- Analyzing the existing land uses including agricultural, industrial, natural and cultural sites; and
- 3- Providing recommendations for appropriate land uses that will allow increasing economic opportunities.

The project area covers the whole mandate of the Jordan Valley Authority, which extends from Yarmouk River in the North to Qater in the South (Wadi Araba); the eastern boundaries are contours 300 and 500 in the area north and south of the Dead Sea, respectively. It should be noted that Umm Qais, which is not within Jordan Valley Authority mandate, has been included in the study due to its importance in establishing the tourism linkages in the area.

On the 19th of February 2004, the United States Agency for International Development (USAID) retained the services of Consolidated Consultants for the Jordan Valley Preliminary Land Use Master Plan Project. The Kick off meeting was held on the 29th of February 2004.

The objective of the Consultant's services as mentioned above is to assess the existing land uses in the project area. The assignment was carried out in three phases. These project phases have been modified from those described in the scope of work so that Phase 1 represents data collection, Phase 2 analysis of existing conditions and establishment of the land use planning, and Phase 3 is related to production of final land use maps for the three zones. Thus, the three phases are as follows:

- **Phase 1** which includes:
 - collecting and disseminating background information and baseline data
 - cross referencing of existing Geographic Information System (GIS) data
 - completing photo survey of the study areas
 - conducting three Focus Groups
 - creating of draft overlay maps of baseline conditions
 - completing interviews
 - participating in the land use planning team workshop
 - presenting baseline findings to client for discussion

- **Phase 2** which includes:
 - analysing the existing conditions in the Jordan Valley
 - creating preliminary drawings (18 A-0)
 - developing design guidelines
 - preparing bibliography of data used for report
 - completing preliminary report text and send copy to project manager and land use planner for editing
- **Phase 3** which includes:
 - informing the team and clients throughout the duration of the project
 - revising text and prepare draft final report with drawings
 - presenting draft final to client
 - revising drawings/ text as necessary layout, printing, binding copies
 - producing the Final Report with overlay land use maps
 - submitting the Final Report to client

1.1 Organization of the Land Use Report

The purpose of the Final Report is to provide the complete details of all work performed, analyses made, and justification of options and recommendations proposed. The Final Report is submitted in five separate volumes which comprise the Land Use Report and the four volumes on the reports by the specialist in the fields of architecture, sociology, transportation, economy, environment, archaeology, geology, and water and agricultural resources. These five volumes are as follows:

- **Volume 1 of 5:** Land Use Report, which is prepared in both Arabic and English languages.
- **Volume 2 of 5:** Planning Process and Architectural Design Guidelines.
- **Volume 3 of 5:** Social, Transportation, and Economic Assessment. This volume also presents a preliminary framework for establishment of fish farms in the study area.
- **Volume 4 of 5:** Environmental Assessment, Dead Sea Carrying Capacity and Archaeological Assessment.
- **Volume 5 of 5:** Geologic Assessment, Water Resources and Agricultural Resources.

2 ENVIRONMENTAL ASSESSMENT

2.1 Introduction

Jordan is centrally located in the Middle East, sharing borders with Syria to the north, Saudi Arabia to the south and southeast, Iraq to the east, and Israel and the Occupied Territories to the west. The country would be landlocked if not for the small (26 kilometres long) shore in Aqaba on the tip of the Gulf of Aqaba, which gives the country its only port and access to the sea. The area of Jordan is about 90,000 square kilometres (km²), of which over 80% is desert.

The Jordan Valley is situated along the northern edge of the Great Rift Valley. This region represents a rich blend of geologic formations, diverse plant and animal species, and ancient human history. With thousands of years of human presence, the Jordan Valley has historical, religious and political importance for many people around the world. The natural environment of the Jordan Valley is being severely impacted by development and population growth. This conflict is especially problematic in the Jordan Valley, where most of the region is agricultural, and the numbers of birds, especially during migration, are the highest in the world. Within the past century, some of the most impressive species have been completely lost from this region such as the Cheetah, Syrian Brown Bear, Nile Crocodile, and the Ostrich, bearded vulture and lappet faced vulture.

Being a bridge connecting three continents, Asia, Africa, and Europe, it supports a wide variety of habitat types such as riparian, marsh, grassland, scrub and arid desert. A wide variety of habitats can be found along the Valley, due to its complex geology and great altitudinal range, ranging from Mediterranean, to non-forest Mediterranean along the margins which are considered transitional zones, to Irano-Turanian to Afro-tropical habitats.

In addition to resident species, the Valley is host to a continual flux of migrating birds. Dozens of these species are listed as globally threatened by the International Union for Conservation of Nature (IUCN). Clearly, the Jordan Valley supports a high biodiversity that is important regionally and globally.

Most of the freshwater marshes were drained to increase agriculture. However, the relationship between agriculture and wildlife is complex. While some types of agriculture can be detrimental to wildlife such as pesticide-laden crops, other types are beneficial such as fishponds and alfalfa fields. In addition, wildlife, particularly birds, can cause significant damage to agriculture. This conflict is especially problematic in the Jordan Valley, where most of the region is agricultural, and the numbers of birds, especially during migration, are the highest in the world.

The tropical ecosystems in the Jordan Valley, Dead Sea area and wadi Araba occur at low altitudes and characterized of hot climate and low precipitation. The presence of plants close to water table allow at some instances for a dense forest vegetation growth dominated by some important species such as the Acacia spp., Ziziphus sp., Calatropis procera, Balanites aegyptiaca and many others. Many of these plants considered locally as rare and for certain species as endangered. The changing land use into agriculture and industries has lead to destroying the natural vegetation cover and changing the ecological balance in the area and the introduction of exotic species.

Besides the amazing climatological conditions and the extraordinary ecological and geological settings, the Jordan Valley enjoys deep rooted cultural and archaeological features. Despite these interesting settings, assets and values, the Jordan Valley is threatened by the unattainable development including the mismanagement of agricultural resources (agricultural patterns, use of chemical, water conservation, organic fertilizers, ...etc), industrial development, water harvesting, retraction of the Dead Sea and the associated sinkholes problems, and the mismanagement of liquid and solid waste.

2.2 The Biological Environment

2.2.1 Ecozones

Two ecozones in the valley are of global importance: the Dead Sea Basin and the Jordan River. Below is a description of the two zones.

(a) Dead Sea Basin

The shores of the Dead Sea and the oasis in its vicinity preserve a rare blend of desert biota and biogeographic 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.

One species of endemic fish and dragon-fly *Caloptryx syriaca* are known to occur in the Dead Sea area. The Mujib 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 Lesser Kestrel and the Egyptian Vulture has recently been discovered.

Birds of restricted range to Middle East 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 potential economic revenue because of its cultural and biological diversity and resources if managed and conserved appropriately.

(b) 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 wetland 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, Freshwater 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. A huge number of birds migrate annually through this narrow corridor, thus making the basin an important migration 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.

2.2.2 Habitats

The area under consideration encompasses a series of distinctive geographic sections: The Jordan river Valley, The Yarmouk river valley, the Dead Sea and its eastern escarpments, the southern Ghors south of Dead Sea and the arid Wadi Araba. Therefore, the Jordan Valley with its great topographical and climatic variations has resulted in hosting a large variety of arid ecosystems in a relatively small area. Population distribution is directly related to the availability of water resources within the valley, being concentrated in the area north of Dead Sea where domestic and irrigation water are available.

In 1994, Birdlife International published a book of Important Bird Areas (IBA) in the Middle East. In 2000, a country inventory of IBAs in Jordan identified 27 sites, covering a total area of around 7,000 km², representing all habitat types, ecosystems and biogeographic zones existing in Jordan. Seven of which are in the Jordanian part of the Valley (see **Figure 1**). These areas are listed as critical for sustaining bird populations within this region. Important bird areas were identified according to the criteria of selection. Furthermore, Jordan is either ratifying and/or signatory to a number of global and regional conventions and agreements. These are to leveraged within the larger vision for the Valley (**Table 1**).

Table 1: Jordan Participation in some related Global and Regional Conventions, Treaties, and Agreements Protecting the Environment

Constitution of the United Nations Educational, Scientific and Cultural Organizations; <i>London, 1945</i>
Convention on the Protection and Use of Transboundary Watercourses and International Lakes; <i>Helsinki, 1992</i>
Treaty on the Non-Proliferation of Nuclear Weapons; <i>Washington, 1968</i>
Convention concerning the Protection of World Cultural and Natural Heritage; <i>Paris, 1972</i>
International Covenant on Economic, Social and Cultural Rights; <i>New York, 1966</i>
Constitution of the United Nations Industrial Development Organization, <i>Vienna, 1979</i>
Protocol to amend the Convention on Wetlands of International Importance especially as Waterfowl Habitat; <i>Paris, 1982</i>
Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal; <i>Basel, 1989</i>
United Nations Framework Convention on Climate Change; <i>New York, 1992</i>
Convention on Biological Diversity; <i>Rio de Janeiro, 1992</i>
Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer; <i>Copenhagen, 1992</i>
Agreement for the Establishment of the Near East Plant Protection Organization; <i>Rabat, 1993</i>
International Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa; <i>Paris, 1994</i>
Agreement on the Conservation of African-Eurasian Migratory Waterbirds; <i>The Hague, 1995</i>
Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer; <i>Montreal, 1997</i>
Convention on Wetlands of International Importance especially as Waterfowl Habitats; Ramsar, 1971; and Amendments to Art. 6&7; <i>Regina (Canada), 1987</i>
Convention on International Trade in Endangered Species of Wild Fauna and Flora; <i>Washington, 1973</i> ; and Amendment (Art.XI); <i>Bonn, 1979</i>
Convention for the Protection of the Ozone Layer, <i>Vienna, 1985</i>
Protocol on Substances that Deplete the Ozone Layer; <i>Montreal, 1987</i> ; and Amendment; <i>London, 1990</i>

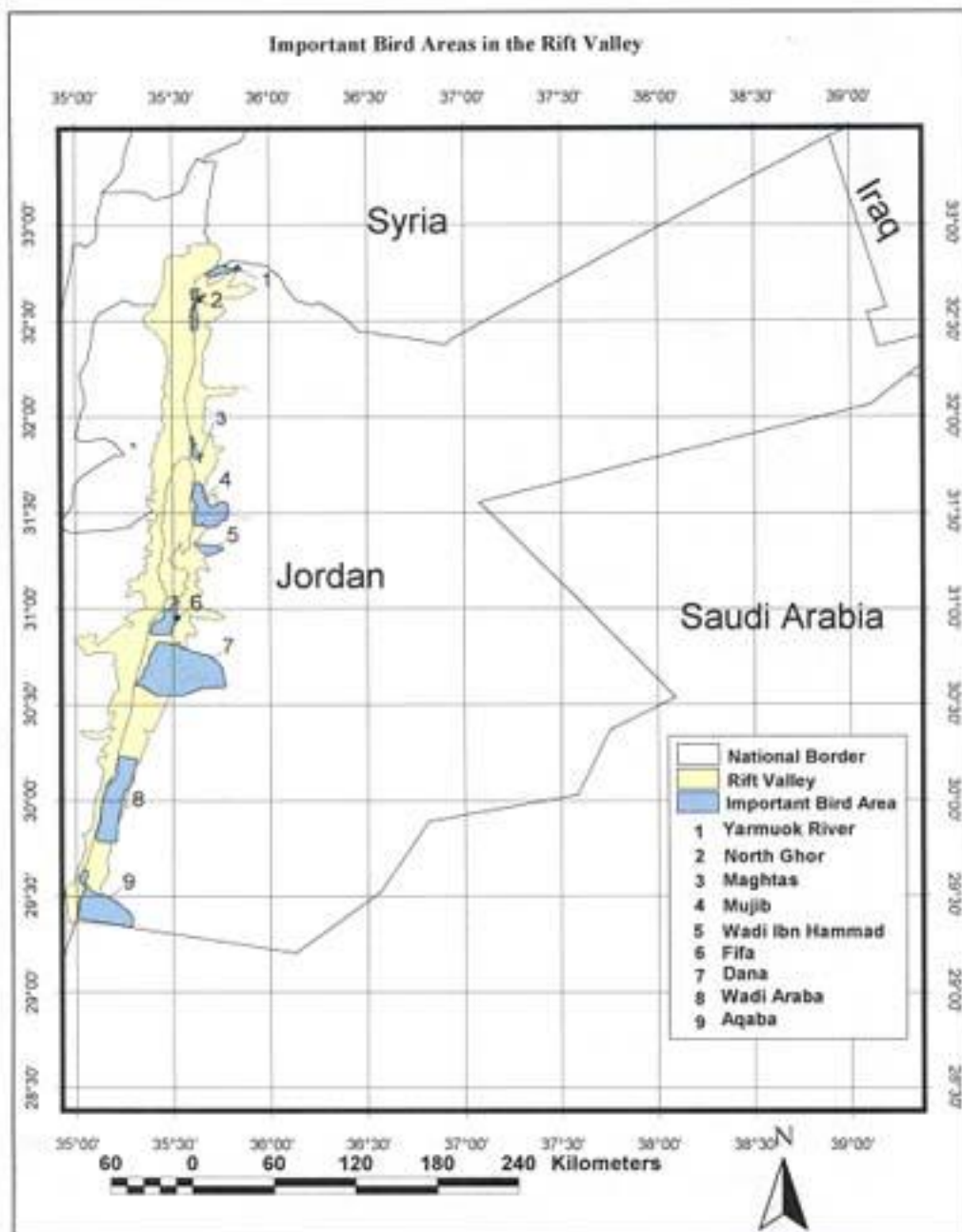


Figure 1: IBAs in the Rift Valley

The Jordan Rift Valley itself, the northern extension of the Great Rift Valley of east Africa, consists of the subtropical Jordan Valley, Dead Sea and Wadi Araba, each with its typical flora and fauna, showing manifest affinities to the Afro tropical region. Parallel to the rift valley run the rift margins and adjacent highlands, which can be subdivided in many faunal regions varying eminently along longitudinal and altitudinal gradients. Habitats range here from deep rocky gorges to flat slopes and plateaux covered by steppe vegetation, dense hydrophytic vegetation along water streams, farmland and Mediterranean woodlands. These areas are home of a variety of resident and breeding birds, in addition to lying on one of the main routes of birds migrating between Eurasia and Africa. These migrants include several globally endangered species, which depend on the natural habitats of the rift and adjacent mountains for resting and feeding.

In term of vegetation the following habitat types can be identified along the Valley as per three zones, Northern, Middle and Southern:

- **Northern Zone**
 - *Artemisia* bush at the steppes
 - Steppe communities of the escarpment
 - Steep limestone scarps in the Mediterranean region dominated by grasses
 - Wadis with Oleander and Tamarix
 - Coppiced oak and scattered trees in northern forest region
- **Middle Zone**
 - *Artemisia* bush at the steppes
 - Steep limestone scarps in the Mediterranean region dominated by grasses
 - Steppe communities of the escarpment
 - *Nitraria retusa* communities
 - Desert region scrub on limestone and marls
 - Sandy wadis bordered with *Retama raetam*
 - Wadis with Oleander and Tamarix
 - *Tamarix* thickets at Baptism site
 - Reed beds at Wadi Kharrar
- **Southern Zone**
 - Salt bush community dominated mainly by chenopods
 - *Nitraria retusa* and *Savadora persica* communities
 - *Haloxylon persicum* communities
 - Steep screes and block fans on granite
 - *Haloxylon* on gravel fans and gradual slopes
 - Bush on gravel plains
 - Sandy wadis with *Haloxylon persicum* at wadis interspersing Wadi Araba
 - Boulder wadi bottoms in the granite areas
 - Bouldery wadi bottoms with *Leptadenia* and *calligonum*
 - Scattered Acacia wadis
 - Wadis with Oleander and Tamarix
 - Mud flats

A list of plant species recorded in the area are presented in **Table 2** with remarks on status, and suitability for grazing. Furthermore, some native xeric plant species that has potential use in landscaping are presented in **Table 3**.

Table 2: Plant species recorded in the study areas

Species	Family	Northern Zone	Middle Zone	Southern Zone	Remarks
<i>Acanthus syriacus</i>	Acanthaceae	*			On degraded Mediterranean
<i>Blepharis ciliaris</i>	Acanthaceae			*	Palatable but not grazed
<i>Aizoon canariense</i>	Aizoaceae		*	*	Sandy and salt areas
<i>Aizoon hispanica</i>	Aizoaceae			*	Sandy and salt areas
<i>Mesebryanthemum forsskalii</i>	Aizoaceae		*	*	Sandy and salt areas
<i>Mesebryanthemum nodiflorum</i>	Aizoaceae			*	Sandy and salt areas
<i>Aerva japonica</i>	Amaranthaceae			*	Palatable but not grazed
<i>Pancratium sikenbrgeri</i>	Amaryllidaceae			*	Palatable but not grazed
<i>Nerium oleander</i>	Apocynaceae		*	*	
<i>Phoenix dactylifera</i>	Aricaceae (Palmae)		*	*	Locally Threatened
<i>Calotropis procera</i>	Asclepiadaceae		*	*	Rare and Locally Threatened
<i>Pergularia tomentosa</i>	Asclepiadaceae			*	
<i>Balanites aegyptiaca</i>	Balanitaceae			*	Rare and Locally Threatened
<i>Anchusa aegyptiaca</i>	Boraginaceae		*	*	Grazed by camels
<i>Arnebia decumbens</i>	Boraginaceae			*	Palatable but not grazed
<i>Arnebia hispidissima</i>	Boraginaceae			*	Palatable but not grazed
<i>Gastrocotyle hispida</i>	Boraginaceae	*	*	*	
<i>Heliotropium arbainese</i>	Boraginaceae			*	Palatable but not grazed
<i>Heliotropium bacciferum</i>	Boraginaceae			*	Palatable but not grazed
<i>Lappula spinocarpos</i>	Boraginaceae	*	*	*	
<i>Capparis cartilaginea</i>	Capparaceae		*	*	
<i>Capparis spinosa</i>	Capparaceae			*	Rare and Locally Threatened
<i>Cleome africana</i>	Capparaceae			*	
<i>Cleome trinervia</i>	Capparaceae			*	
<i>Maerua crassifolia</i>	Capparaceae			*	Rare and Locally Threatened
<i>Gymnocarpos decandrum</i>	Caryophyllaceae		*	*	
<i>Herniaria hirsute</i>	Caryophyllaceae	*	*	*	
<i>Paronychia arabica</i>	Caryophyllaceae			*	
<i>Paronychia sinaica</i>	Caryophyllaceae		*	*	
<i>Pteranthus dichotomus</i>	Caryophyllaceae		*	*	
<i>Robbairia delileana</i>	Caryophyllaceae		*	*	
<i>Sclerosephalus arabicus</i>	Caryophyllaceae			*	
<i>Silene damascena</i>	Caryophyllaceae	*	*	*	
<i>Silene villosa</i>	Caryophyllaceae		*	*	
<i>Seprgula fallax</i>	Caryophyllaceae			*	
<i>Spergularia diandra</i>	Caryophyllaceae			*	
<i>Anabasis articulata</i>	Chenopodiaceae		*	*	Grazed
<i>Arthrocnemum macrostachyum</i>	Chenopodiaceae			*	
<i>Atriplex dimorphostegia</i>	Chenopodiaceae			*	Palatable but not grazed
<i>Atriplex halimus</i>	Chenopodiaceae		*	*	Grazed
<i>Bassia eriophora</i>	Chenopodiaceae			*	
<i>Bassia muricata</i>	Chenopodiaceae			*	
<i>Chenopodium album</i>	Chenopodiaceae	*	*	*	
<i>Chenopodium murale</i>	Chenopodiaceae		*	*	

Species	Family	Northern Zone	Middle Zone	Southern Zone	Remarks
<i>Halocnemum strobilaceum</i>	Chenopodiaceae			*	Rare, Grazed
<i>Haloxylon persicum</i>	Chenopodiaceae			*	Grazed mainly by camels
<i>Hammada salicornica</i>	Chenopodiaceae			*	
<i>Hammada scopira</i>	Chenopodiaceae			*	
<i>Salsola baryosma</i>	Chenopodiaceae	*	*	*	
<i>Salsola jordanicola</i>	Chenopodiaceae			*	Endemic
<i>Salsola vermiculata</i>	Chenopodiaceae	*	*	*	Palatable but not grazed
<i>Seidlitzia rosmarinus</i>	Chenopodiaceae		*	*	
<i>Suaeda aegyptiaca</i>	Chenopodiaceae	*	*	*	
<i>Suaeda palaestina</i>	Chenopodiaceae			*	Rare
<i>Traganum nodatum</i>	Chenopodiaceae			*	Palatable but not grazed
<i>Helianthemum lipii</i>	Cistaceae		*	*	Palatable but not grazed
<i>Inula crithmoides</i>	Compositae		*	*	
<i>Aaronsohnia factorovskyi</i>	Compositae			*	
<i>Anthemis melampodina</i>	Compositae		*	*	
<i>Anvillea garcinii</i>	Compositae			*	
<i>Asteriscus graveolens</i>	Compositae	*	*	*	Palatable but not grazed
<i>Asteriscus pygmaeus</i>	Compositae	*	*	*	Palatable but not grazed
<i>Calendula arvensis</i>	Compositae	*	*	*	
<i>Carlina hispanica</i>	Compositae	*	*	*	Palatable but not grazed
<i>Carthamus glaucus</i>	Compositae		*	*	Palatable but not grazed
<i>Centaurea aegyptiaca</i>	Compositae		*	*	
<i>Centaurea hayololepis</i>	Compositae		*	*	
<i>Centaurea erygnoides</i>	Compositae			*	Palatable but not grazed
<i>Cichorium pumilum</i>	Compositae	*	*	*	Palatable but not grazed
<i>Conyza bonariensis</i>	Compositae		*	*	
<i>Crepis radicata</i>	Compositae	*	*	*	Palatable but not grazed
<i>Filago desrortum</i>	Compositae		*	*	Palatable but not grazed
<i>Gymnarrhena micrantha</i>	Compositae	*	*	*	Palatable but not grazed
<i>Ifloga spicata</i>	Compositae			*	
<i>Koelpinia linearis</i>	Compositae		*	*	Palatable but not grazed
<i>Launaea angustifolia</i>	Compositae		*	*	Palatable but not grazed
<i>Launaea mucronata</i>	Compositae		*	*	Palatable but not grazed
<i>Launaea nudicaulis</i>	Compositae		*	*	Palatable but not grazed
<i>Lessera lyseroides</i>	Compositae			*	
<i>Matricaria aurea</i>	Compositae				
<i>Phagnalone barbeyanum</i>	Compositae	*	*	*	
<i>Pulicaria arabica</i>	Compositae			*	
<i>Pulicaria crispa</i>	Compositae			*	
<i>Pulicaria incisa</i>	Compositae			*	
<i>Reichardia tingitana</i>	Compositae		*	*	Palatable but not grazed

Species	Family	Northern Zone	Middle Zone	Southern Zone	Remarks
<i>Senecio flavus</i>	Compositae			*	
<i>Senecio glaucus</i>	Compositae		*	*	
<i>Senecio vernalis</i>	Compositae	*	*	*	
<i>Sonchus maritimus</i>	Compositae			*	
<i>Sonchus oleceracus</i>	Compositae		*	*	Palatable but not grazed
<i>Anastatica heirochuntica</i>	Cruciferae			*	
<i>Cakile maritima</i>	Cruciferae			*	
<i>Carrichtera annua</i>	Cruciferae			*	Palatable but not grazed
<i>Diplotaxis erucoides</i>	Cruciferae		*	*	Palatable but not grazed
<i>Diplotaxis harra</i>	Cruciferae			*	Palatable but not grazed
<i>Erophila verna</i>	Cruciferae			*	
<i>Erucaria pinnata</i>	Cruciferae		*	*	Grazed
<i>Erucaria boveana</i>	Cruciferae	*	*	*	Palatable but not grazed
<i>Farsetia aegyptiaca</i>	Cruciferae		*	*	Grazed
<i>Hirschfeldia incana</i>	Cruciferae		*	*	Palatable but not grazed
<i>Lobularia arabica</i>	Cruciferae			*	Palatable but not grazed
<i>Malcolmia chia</i>	Cruciferae			*	Palatable but not grazed
<i>Maresia pygmaea</i>	Cruciferae			*	
<i>Matthiola parviflora</i>	Cruciferae		*	*	Grazed
<i>Morettia canescens</i>	Cruciferae			*	
<i>Nasturtium officinale</i>	Cruciferae			*	
<i>Noteceras bicornis</i>	Cruciferae			*	Palatable but not grazed
<i>Savignya parviflora</i>	Cruciferae			*	Palatable but not grazed
<i>Schimpera arabica</i>	Cruciferae			*	
<i>Sisymbrium irio</i>	Cruciferae			*	Palatable but not grazed
<i>Zilla spinosa</i>	Cruciferae			*	Palatable but not grazed
<i>Citrullus colocyntis</i>	Cucurbitaceae			*	
<i>Cucumis prophetarum</i>	Cucurbitaceae		*	*	
<i>Cyperus fucus</i>	cyperaceae			*	
<i>Cyperus longus</i>	cyperaceae		*	*	
<i>Cyperus rotundus</i>	cyperaceae		*	*	
<i>Scirpus holoschoenus</i>	cyperaceae			*	
<i>Pterocephalus brevis</i>	Dipsacaceae		*	*	
<i>Ephedra alte</i>	Ephedraceae		*	*	Grazed
<i>Equisetum ramosissimum</i>	Equisitaceae			*	Rare
<i>Chrozophora oblongifolia</i>	Euphorbiaceae			*	Rare
<i>Mercularis annua</i>	Euphorbiaceae			*	
<i>Ricinus communis</i>	Euphorbiaceae			*	
<i>Frankenia pulverulenta</i>	Frankeniaceae			*	
<i>Fumaria densiflora</i>	Fumariaceae		*	*	
<i>Erodium cicutarium</i>	Geraniaceae		*	*	Palatable but not grazed
<i>Erodium deserti</i>	Geraniaceae			*	Palatable but not grazed
<i>Erodium glaucophyllum</i>	Geraniaceae	*	*	*	Palatable but not grazed
<i>Erodium hirtum</i>	Geraniaceae	*	*	*	Grazed

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Species	Family	Northern Zone	Middle Zone	Southern Zone	Remarks
<i>Erodium laciniatum</i>	Geraniaceae	*	*	*	Grazed
<i>Mansonia nivea</i>	Geraniaceae		*	*	
<i>Aeluropus litoralis</i>	Gramineae			*	
<i>Bromus fasciculatus</i>	Gramineae	*	*	*	Palatable but not grazed
<i>Cutandia dichotoma</i>	Gramineae		*	*	Palatable but not grazed
<i>Cynodon dactylon</i>	Gramineae	*	*	*	Palatable but not grazed
<i>Diplachne fusca</i>	Gramineae			*	Palatable but not grazed
<i>Hordeum glaucum</i>	Gramineae	*	*	*	Palatable but not grazed
<i>Hordeum spontaneum</i>	Gramineae	*			Palatable but not grazed
<i>Lolium rigidum</i>	Gramineae	*	*	*	Palatable but not grazed
<i>Panicum turgidum</i>	Gramineae			*	Palatable but not grazed
<i>Pennisitum divisum</i>	Gramineae			*	Rare
<i>Pennisetum elatum</i>	Gramineae			*	Palatable but not grazed
<i>Pennisetum orientale</i>	Gramineae		*	*	Palatable but not grazed
<i>Pennisetum setaceum</i>	Gramineae			*	Palatable but not grazed
<i>Phragmites australis</i>	Gramineae	*	*	*	
<i>Phalaris</i> sp.	Gramineae		*	*	Palatable but not grazed
<i>Polypogon fugax</i>	Gramineae			*	Palatable but not grazed
<i>Polypogon monspeliensis</i>	Gramineae			*	Palatable but not grazed
<i>Polypogon semiverticillatus</i>	Gramineae			*	Palatable but not grazed
<i>Saccharum spontaneum</i>	Gramineae			*	Palatable but not grazed
<i>Schismus barbatus</i>	Gramineae	*	*	*	Grazed
<i>Stipa capensis</i>	Gramineae	*	*	*	Grazed
<i>Stipa hohenackeriana</i>	Gramineae			*	Palatable but not grazed
<i>Stipagrostis ciliata</i>	Gramineae			*	Grazed
<i>Stipagrostis obtuse</i>	Gramineae			*	Palatable but not grazed
<i>Stipagrostis plumosa</i>	Gramineae			*	Palatable but not grazed
<i>Juncus acutus</i>	Juncacaceae		*	*	
<i>Juncus rigidus</i>	Juncacaceae			*	
<i>Lavendula pubescense</i>	Labiatae	*	*	*	
<i>Mentha longifolia</i>	Labiatae		*	*	
<i>Salvia aegyptiaca</i>	Labiatae	*	*	*	Palatable but not grazed
<i>Salvia lanigra</i>	Labiatae		*	*	
<i>Acacia tortilis</i>	Leguminoseae			*	Locally Threatened
<i>Acacia raddiana</i>	Leguminoseae			*	Locally Threatened
<i>Alhagi maurorum</i>	Leguminoseae		*	*	
<i>Astragalus bombycinus</i>	Leguminoseae			*	Palatable but not grazed
<i>Astragalus haurensis</i>	Leguminoseae	*	*	*	Palatable but not

Species	Family	Northern Zone	Middle Zone	Southern Zone	Remarks
					grazed
<i>Astragalus hispidulus</i>	Leguminosae	*	*	*	Palatable but not grazed
<i>Astragalus spinosum</i>	Leguminosae		*	*	Palatable but not grazed
<i>Astragalus tribuloides</i>	Leguminosae	*	*	*	Palatable but not grazed
<i>Lytherus heirosolymitanus</i>	Leguminosae		*	*	Palatable but not grazed
<i>Lotonis platycarpa</i>	Leguminosae		*	*	Palatable but not grazed
<i>Lotus halophilus</i>	Leguminosae			*	Palatable but not grazed
<i>Medicago laciniata</i>	Leguminosae		*	*	Palatable but not grazed
<i>Medicago truncatula</i>	Leguminosae		*	*	Palatable but not grazed
<i>Melilotus messanensis</i>	Leguminosae	*	*	*	Palatable but not grazed
<i>Ononis natrix</i>	Leguminosae	*	*	*	
<i>Ononis sicula</i>	Leguminosae		*	*	
<i>Retama raetam</i>	Leguminosae	*	*	*	Grazed
<i>Trifolium agrutum</i>	Leguminosae	*	*	*	Palatable but not grazed
<i>Trifolium spumosum</i>	Leguminosae	*	*	*	Palatable but not grazed
<i>Trigonella stellata</i>	Leguminosae			*	Palatable but not grazed
<i>Vicia esdraelonensis</i>	Leguminosae	*	*	*	Palatable but not grazed
<i>Vicia perigrina</i>	Leguminosae	*	*	*	Palatable but not grazed
<i>Parkinsonia</i> sp.	Leguminosae	*	*	*	
<i>Prosopis</i> sp.	Leguminosae		*	*	
<i>Allium sinaiticum</i>	Liliaceae			*	
<i>Allium desertorum</i>	Liliaceae		*	*	
<i>Androcymbium palaestinum</i>	Liliaceae	*	*	*	Grazed
<i>Asphodelus fistulosus</i>	Liliaceae	*	*	*	
<i>Asphodelus viscidulus</i>	Liliaceae		*	*	
<i>Bellevalia desertora</i>	Liliaceae			*	
<i>Dipcadi erythraeum</i>	Liliaceae			*	
<i>Urginea maritima</i>	Liliaceae	*	*	*	
<i>Loranthus acaciae</i>	Loranthaceae			*	
<i>Abutilon hirtum</i>	Malvaceae			*	Rare
<i>Alcea striata</i>	Malvaceae	*	*	*	
<i>Malva parviflora</i>	Malvaceae	*	*	*	Palatable but not grazed
<i>Cocculus pendulus</i>	Menispermaceae			*	
<i>Ficus salicifolia</i>	Moraceae			*	Palatable but not grazed
<i>Moringa peregrina</i>	moringaceae		*	*	Rare, locally threatened
<i>Eucalyptus camaldulensis</i>	Myrtaceae	*	*	*	
<i>Neuroda procumbens</i>	Neuradaceae			*	
<i>Commicarpus africana</i>	Nyctaginaceaea			*	
<i>Cistanche salsa</i>	Orobanchaceae			*	
<i>Cistanche tubulosa</i>	Orobanchaceae			*	
<i>Orobancha cernua</i>	Orobanchaceae		*	*	
<i>Papaver polytrichum</i>	Papveraceae	*	*	*	

Species	Family	Northern Zone	Middle Zone	Southern Zone	Remarks
<i>Plantago albicans</i>	Plantagonaceae		*	*	Palatable but not grazed
<i>Plantago ciliata</i>	Plantagonaceae			*	Palatable but not grazed
<i>Plantago coronopus</i>	Plantagonaceae			*	Palatable but not grazed
<i>Plantago cylindrical</i>	Plantagonaceae		*	*	Palatable but not grazed
<i>Plantago natata</i>	Plantagonaceae		*	*	Palatable but not grazed
<i>Plantago ovata</i>	Plantagonaceae			*	Palatable but not grazed
<i>Plantago pumilla</i>	Plantagonaceae			*	Palatable but not grazed
<i>Limonium thouinii</i>	Plumbaginaceae		*	*	Palatable but not grazed
<i>Calligonum cumosum</i>	Polygonaceae			*	Locally Threatened
<i>Emex spinosa</i>	Polygonaceae		*	*	Grazed
<i>Polygonum sp.</i>	Polygonaceae			*	Grazed
<i>Rumex cyprius</i>	Polygonaceae			*	Grazed
<i>Rumex pictus</i>	Polygonaceae			*	Grazed
<i>Anagalis arvensis</i>	Primulaceae	*	*	*	
<i>Portulaca oleracea</i>	Portulacaceae	*	*	*	
<i>Adonis dentate</i>	Ranunculaceae	*	*	*	
<i>Caylausea hexagyna</i>	Resedaceae		*	*	
<i>Ochradenus baccatus</i>	Resedaceae			*	Locally Threatened
<i>Oligomeris subulata</i>	Resedaceae		*	*	
<i>Reseda arabica</i>	Resedaceae			*	
<i>Reseda boissieri</i>	Resedaceae		*	*	
<i>Reseda stenostachya</i>	Resedaceae			*	
<i>Ziziphus spina-christae</i>	Rhamnaceae	*	*	*	Locally Threatened
<i>Ziziphus lotus</i>	Rhamnaceae	*	*		Palatable but not grazed
<i>Crucianella herbacea</i>	Rubiaceae			*	
<i>Ruppia maritima</i>	Ruppiaceae			*	
<i>Haplophyllum tuberculatum</i>	Rutaceae		*	*	Palatable but not grazed
<i>Salvadora persica</i>	Salvadoraceae			*	Locally Threatened
<i>Antirrhinum orontium</i>	Scrophulariaceae			*	
<i>Bacopa monnieri</i>	Scrophulariaceae			*	
<i>Kickxia floribunda</i>	Scrophulariaceae			*	
<i>Kickxia spartioides</i>	Scrophulariaceae			*	
<i>Linaria haelava</i>	Scrophulariaceae			*	
<i>Scrophularia deserti</i>	Scrophulariaceae			*	
<i>Verbascum sinuatum</i>	Scrophulariaceae		*	*	
<i>Hyoscyamus aureus</i>	Solanaceae		*	*	
<i>Hyoscyamus pusillus</i>	Solanaceae			*	
<i>Hyoscyamus reticulatus</i>	Solanaceae	*			
<i>Lycium depressum</i>	Solanaceae		*	*	Grazed
<i>Lycium europeum</i>	Solanaceae		*	*	Grazed
<i>Lycium shawii</i>	Solanaceae			*	Grazed
<i>Solanum incanum</i>	Solanaceae		*	*	
<i>Solanum luteum</i>	Solanaceae			*	
<i>Solanum sinaicum</i>	Solanaceae			*	
<i>Reaumuria hirtella</i>	Tamaricaceae			*	Grazed
<i>Tamarix jordanis</i>	Tamaricaceae		*	*	Endemic and Locally Threatened
<i>Tamarix nilotica</i>	Tamaricaceae		*	*	
<i>Tamarix tetragyna</i>	Tamaricaceae		*	*	

Species	Family	Northern Zone	Middle Zone	Southern Zone	Remarks
<i>Corchorus trilocularis</i>	Tiliaceae			*	
<i>Ammi majus</i>	Umbelliferae	*	*	*	
<i>Anisosciadium isosciadium</i>	Umbelliferae	*	*	*	
<i>Ferula sp.</i>	Umbelliferae	*	*	*	
<i>Foeniculum vulgaris</i>	Umbelliferae		*		
<i>Pimpinella cretica</i>	Umbelliferae	*	*	*	
<i>Forsskaolea tenacissima</i>	Urticaceae			*	
<i>Parietaria alsinifolia</i>	Urticaceae			*	
<i>Urtica urens</i>	Urticaceae		*		
<i>Fagonia arabica</i>	Zygophyllaceae			*	Rare
<i>Fagonia bruguieri</i>	Zygophyllaceae			*	
<i>Fagonia glutinosa</i>	Zygophyllaceae			*	
<i>Fagonia latifolia</i>	Zygophyllaceae			*	
<i>Fagonia mollis</i>	Zygophyllaceae		*	*	
<i>Nitraria retusa</i>	Zygophyllaceae		*	*	
<i>Peganum harmala</i>	Zygophyllaceae		*	*	
<i>Tribulus bimucronatus</i>	Zygophyllaceae			*	Rare
<i>Tribulus longipetalus</i>	Zygophyllaceae		*	*	
<i>Zygophyllum dumosum</i>	Zygophyllaceae		*	*	Grazed
<i>Zygophyllum simplex</i>	Zygophyllaceae			*	

Table 3: Xeric plants

Species	Family
<i>Phoenix dactylifera</i>	Aricaceae (Palmae)
<i>Calotropis procera</i>	Asclepiadaceae
<i>Anabasis articulata</i>	Chenopodiaceae
<i>Atriplex dimorphostegia</i>	Chenopodiaceae
<i>Atriplex halimus</i>	Chenopodiaceae
<i>Halocnemum strobilaceum</i>	Chenopodiaceae
<i>Haloxylon persicum</i>	Chenopodiaceae
<i>Hammada salicornica</i>	Chenopodiaceae
<i>Salsola vermiculata</i>	Chenopodiaceae
<i>Seidlitzia rosmarinus</i>	Chenopodiaceae
<i>Traganum nodatum</i>	Chenopodiaceae
<i>Acacia raddiana</i>	Leguminosae
<i>Acacia tortilis</i>	Leguminosae
<i>Calligonum cumosum</i>	Polygonaceae
<i>Ochradenus baccatus</i>	Resedaceae
<i>Ziziphus spina-christae</i>	Rhamnaceae
<i>Salvadora persica</i>	Salvadoraceae
<i>Tamarix jordanis</i>	Tamaricaceae
<i>Tamarix nilotica</i>	Tamaricaceae
<i>Tamarix tetragyna</i>	Tamaricaceae

2.2.3 Ecological Sensitive Sites and Hotspots

Several hotspots can be identified in the Jordan Valley based on its ecological features and biodiversity. The following discussion presents the most impotent, rare and yet sensitive ecological sites. The criteria based on which those sites were identified include the IBAs criteria, the RSCN reserves (see **Figure 2**) and the biological corridors. These hotspots represent the conservation priority areas within the valley.

The criteria for selecting IBAs in the Middle East designed by the Birdlife International (Evans, M.I., 1995) are presented in **Table 4**.

Table 4: Criteria for selecting IBAs in the Middle East

#	Category	Criteria
1	Sites supporting globally threatened species	The site regularly holds the species
2I	Sites where birds concentrate in important numbers, either when breeding, or on passage, or in winter	The site holds an average of 1% or more of a seabird or waterfowl species' biogeographical, flyway or Middle Eastern population
2II		The site holds an average of 20,000 or more waterfowl
2III		The site is a migratory bottleneck where, on average, more than 5,000 storks or 3,000 raptors or 2,000 cranes pass during spring and/or autumn migration
3	Sites for species which are threatened or declining throughout all or large parts of their range in the Middle East	The site is one of the five most important for the species in the Middle Eastern country in question.
4	Sites for species which have relatively small total world ranges with important populations in the Middle East	The site is one of the five most important for the species in the Middle Eastern country in question.
5I	Sites for representative, rare, threatened or unique habitats possessing characteristics associated bird communities	The site is a particularly good representative example of a natural or near-natural habitat with a characteristic bird community, in the appropriate biogeographical region
5II		The site is an example of a habitat (with a characteristic bird community in the appropriate biogeographical region) which is rare, and/or unusual, and/or vulnerable to detrimental change
6	Sites important for bird conservation because of their value for education, research or tourism	The site is a center for education/recreation/research/tourism which generates benefits for bird conservation
		The site has excellent potential to become as a centre for education/research/tourism which would benefit bird conservation

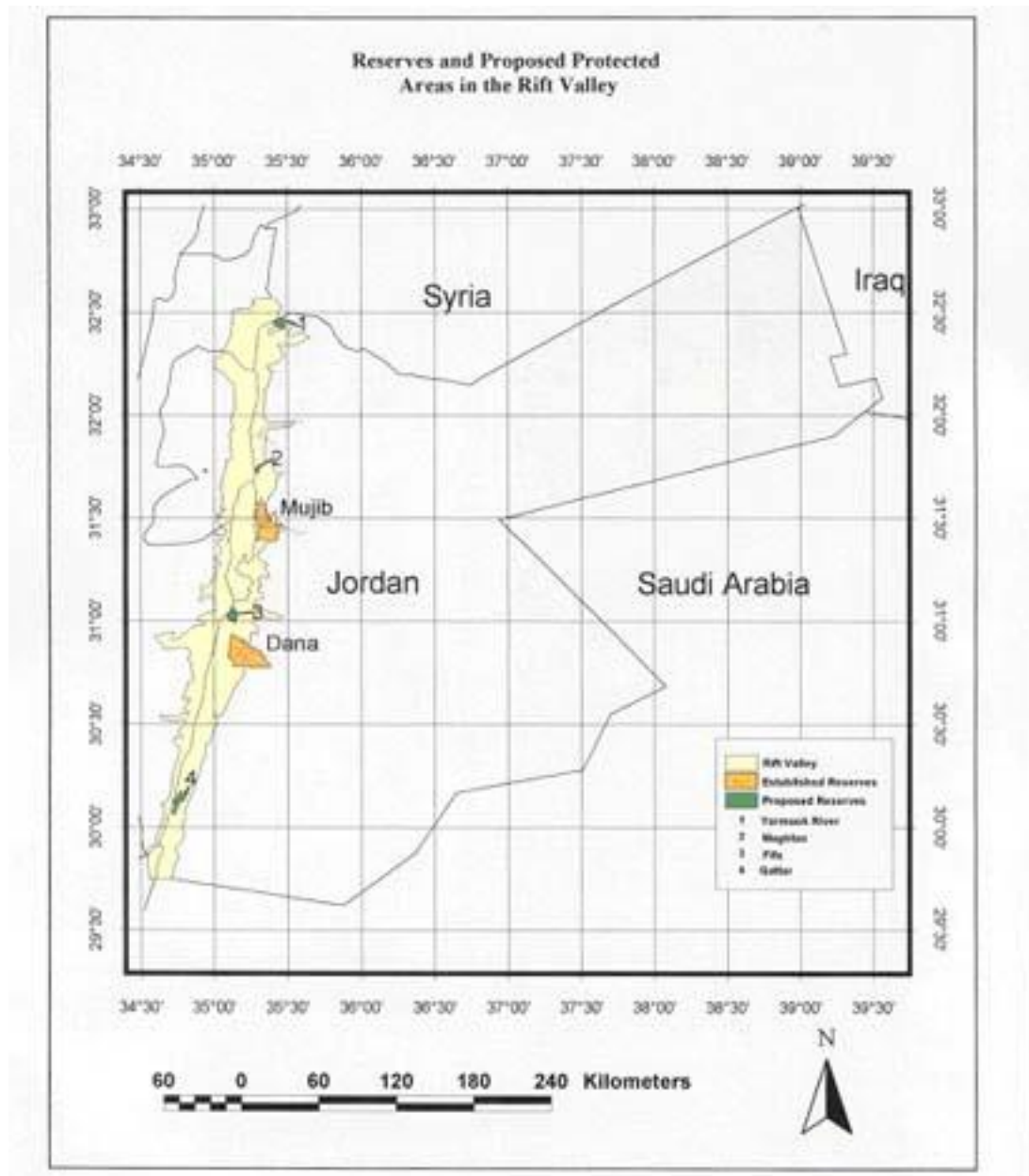


Figure 2: Reserves and proposed protected areas in the Rift Valley

(a) Wadi Yarmouk

Importance: IBA (Criteria: 1, 2III, 3, 4, 5II), RSCN Proposed Protected Area, Biological Corridor
 Protection Status: Significant portion of the IBA is a Proposed Protected Area
 Sensitivity: High
 Rarity: High

A steep-sided valley with a small river surrounded by Nerium and Salix thickets. There are remnant stands of deciduous oak on the slopes which are generally covered by low shrubs and used as farmland. Located on the Syrian border, the Yarmuk river was one of the least disturbed valley systems in Jordan, but water pumping and agricultural expansion are increasingly threatening wildlife and habitats.

The proposed Yarmouk protected area (see **Figure 3**) represents the deciduous oak forest vegetation type (*Quercus aegilops*) of 30 square kilometres, forming almost the best pure

stand and restricted to the eastern part of the Mediterranean geographical region. The Forest varies in altitude from 200 meters below sea level to 500 meters above sea level. The local climate is characterized by humid, cool winters with temperatures reaching a minimum of 6.9 °C and hot dry summers with maximum temperatures of 44.8 °C. The average rainfall in the area is around 400 millimetres per year.

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.

Resident and breeding birds include Marbled Teal (possible), Griffon Vulture (non-breeding resident, Brown Fish Owl (possibly extinct), Sand Partridge (rare), Smyrna and Pied Kingfishers, Syrian Woodpecker, Hoopoe, Palestine Sunbird, Rufous Bush Robin, Olivaceous and Sardinian Warblers, Little Swift and Spanish Sparrow.

Migrating raptors include Honey and Steppe Buzzards and Lesser Spotted Eagle. Cormorant, Pygmy Cormorant, Finsch's Wheatear, Stonechat and European Serin are winter visitors to the site.

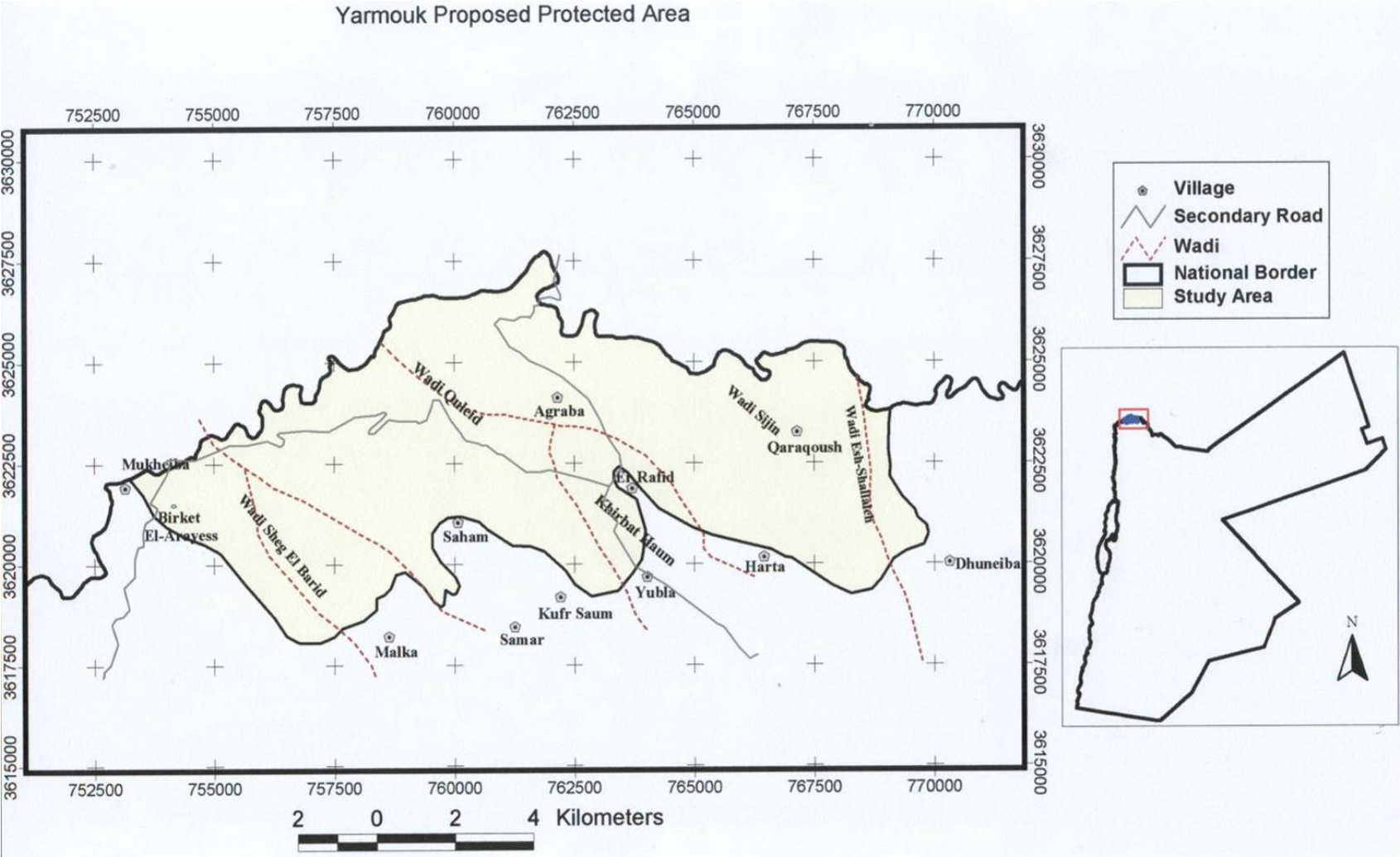


Figure 3: Yarmouk protected area

(b) Northern Jordan Valley

Importance: IBA (Criteria: 1, 2I, 2III, 3, 4, 5II), the stretch close to river Jordan is a biological corridor
 Protection Status: Not Protected
 Sensitivity: Medium
 Rarity: Low

A flat, open agricultural plain bordering the Jordan River (see **Figure 4**). Tamarix thickets and reed beds can be found along the river. Scattered poplar and eucalyptus trees attract several species of Herons. Other birds of this site include the breeding Marbled Teal, Black Francolin, Pied Kingfisher and Clamorous Reed Warbler. Cattle Egret, Masked Shrike and Indian Silverbill (Introduced) are usually present in neighbouring farms.

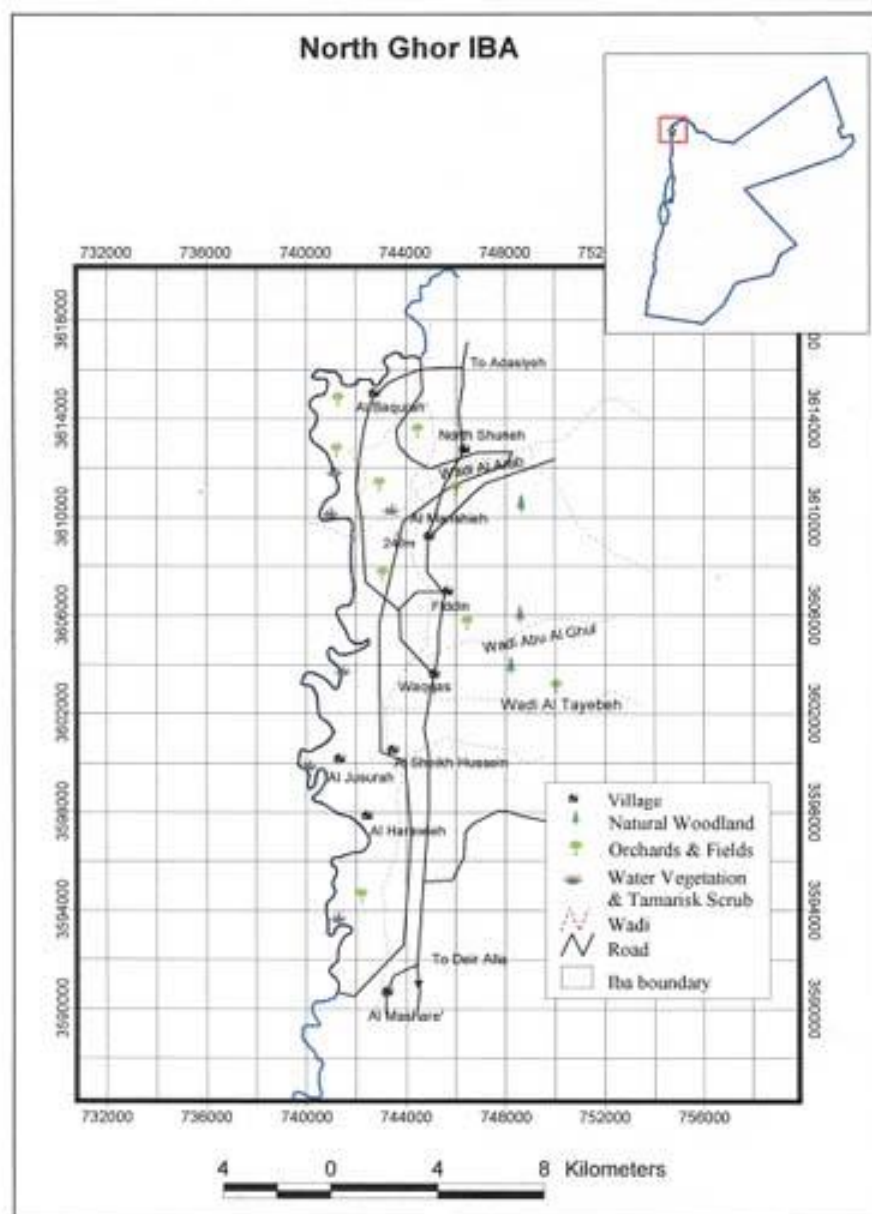


Figure 4: North Ghor IBA

Pygmy Cormorant and Egyptian Vulture are non-breeding residents, while Cornkrake, Bittern, White and Black Storks, Honey Bussard, Levant Sparrowhawk, Great Snipe and Syrian Serin have been recorded as migrants or winter visitors.

(c) Maghtas – Suweimah

Importance:	IBA (Criteria: 1, 2I, 2III, 3, 4, 6), the stretch close to river Jordan is a biological corridor
Protection Status:	Partially protected (Wadi Alkharar area)
Sensitivity:	High
Rarity:	High

The southern part of the Jordan River, including Wadi Al-Kharar (Baptism site) and the northern shores of the Dead Sea (around 390 m below sea level) (see **Figure 5**). Silt plains adjacent to the river are subject to occasional flooding. The water level of the river has become very low in recent years due to over pumping for agriculture and the water itself has become rather saline. *Tamarix* thickets, reeds and other, subtropical vegetation dominate along the river, in side wadis and on the northern edge of the Dead Sea. Breeding birds include Collared Dove, Turtle Dove, Sand Partridge, Black Francolin, Little Bittern, Cream-coloured Cursor, Blue-checked Bee-eater, Smyrna Kingfisher, Arabian Babbler, Spanish and Dead Sea Sparrows. Other non-breeding residents or visitors include Marsh Harrier, Egyptian Vulture and Cattle Egret, while the White Stork and Corncrake have been recorded as spring migrants.

Luckily, the most sensitive localities of the site are close to the Jordan River and border with very limited access, which indeed is an advantage for conserving such biological hotspot. However, the site is currently under the threat of intensive grazing, woodcutting and fires by the local community, visitors and construction workers.

The area include private lands, national park, tourism reserve (Wadi Al-Kharar) and governmental land. Recently, significant proportions of this area were allocated for developmental projects including tourism development. A limiting factor to tourism advantage is that the site is adjacent to the boarder and for security reasons visitors access is restricted, however it is expected that in the future such restrain could be lifted and access to the river will be easier and thus more tourist would be able to visit the site. This approach may not consider the biological, cultural and spiritual value of the site. It is anticipated that tourism development and the planned influx of tourist would negatively impact this sensitive site including:

- Loss of sensitive and rare habitat by construction activities.
- Development of tourist infrastructure might cause introduction of exotic and invasive species and this could affect the naturality, rarity and species diversity of the site.
- Loss of biological diversity (birds, mammal and vegetation) due to disturbance and direct killing by vehicles and hunting activities by local and other tourists.
- Pollution problems caused by the accumulation of solid and liquid wastes (construction and operation).
- Fires made by campers.
- Disturbance caused by vehicles accessing the site.

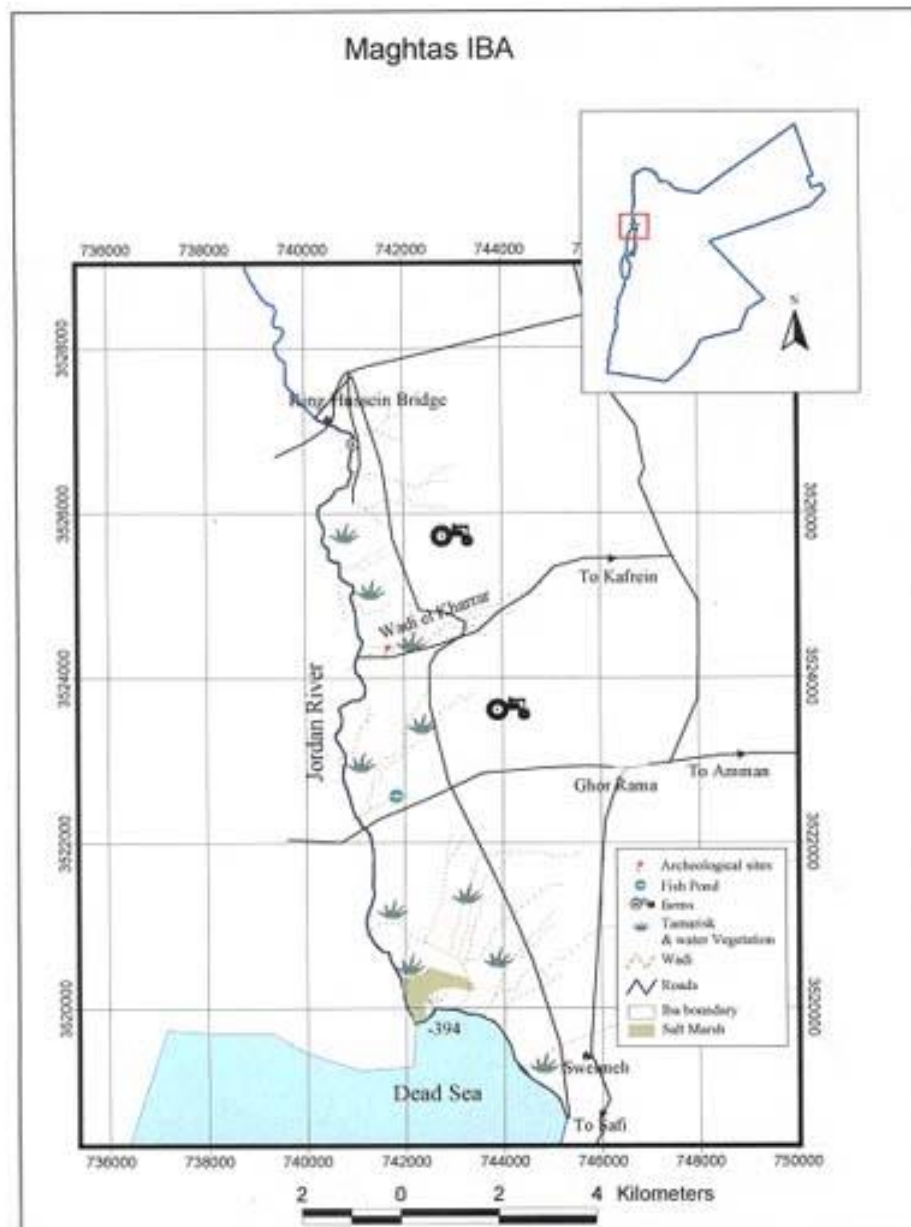


Figure 5: Maghtas IBA

Since the site natural values are not yet exploited nor aggressively promoted as a tourism destination, eco-tourism especially bird-watching and other environment friendly tourism activities can be developed within the site in order to benefit the tourism assets of the site and in the same time conserve its biological features. On the other hand, establishing ecological monitoring station and ecotourism orientation centre could attract more tourists to the site and through the valley. It is also extremely essential to enforce proper environmental management at the site, including controlling the expected burst in tourist activities in a sustainable fashion and within the carrying capacity of the site.

The natural primary vegetation should remain untouched, as this wood of Tamarix is an endemic plant of Jordan. Due to the global, regional and local importance of the site it is recommended to manage the site according to its natural and cultural resources, and to declare it as a protected area.

Developing the site into Ecological Based Tourism Reserve would enhance both economical development and conservation of biological environment. The unique habitat occurring at the site should be promoted and conserved through long-term conservation action by the relative authorities, and should include the Ministry of Tourism along with the JVA. This will

improve and conserve the unique endogenous Tamarix woods and the associated avifauna of the site, especially the Dead Sea Sparrow.

Prior to development in the site, EIA and environmental management plans should be prepared at high standards and implemented efficiently. This includes the preparation, construction and operation phases. However, construction activities should be very minimal and all tourism activities should be environmentally sound.

The site management plan should define boundaries of the site including buffer zone and establish a zoning plan for important habitats and breeding, and feeding sites for key species and habitats, maintain the landscape and amenity features of the site in accordance with its status as an area of outstanding natural beauty, and guarantee maintaining series of ecosystems, principally salt marcher, tamarix woods and their ecotones which collectively contribute to the site uniqueness for tourists and scientists, particularly with regard to the diversity of breeding and migratory birds and other wildlife.

(d) Safi-Fifa

Importance:	IBA (Criteria: 1, 2III, 3, 4, 5II), the stretch close to river Jordan is a biological corridor, Proposed Protected Area
Protection Status:	Not Protected
Sensitivity:	Medium
Rarity:	High

Agricultural plains with sand and silt dunes covered with halophytic and subtropical vegetation south of the Dead Sea between the villages of Safi and Fifa, and adjacent rocky hillsides (see **Figure 6**). Several Wadis run into the Dead Sea through this site and there are some water springs supporting locally dense Tamarix scrub and reed stands. Other threatened trees include *Salvadora persica* and *Mareua crassifolia*. The area is threatened by industrial developments, but the dikes of the potash factories at Safi attract migrating waders, and Black-winged Stilts have even bred at this artificial wetland site. Breeding birds include Bonelli's Eagle and Sooty Falcon (in close hills), Black Francolin, Sand Partridge, Namaqua, Turtle, Collared, Palm and Rock Doves, Blue-checked Bee-eater, Great Grey Shrike, White-crowned Black and Hooded Wheatears, Tristram's Grackle, Arabian Babbler, Fan-tailed Raven and Dead Sea Sparrow. The Indian Silverbill has been recently recorded as breeding resident while Houbara Bustard and Syrian Serin were seen at Fifa in winter. Migrants include Levant Sparrow Hawk, Honey Buzzard, Black Kite, White Stork and Corncrake.

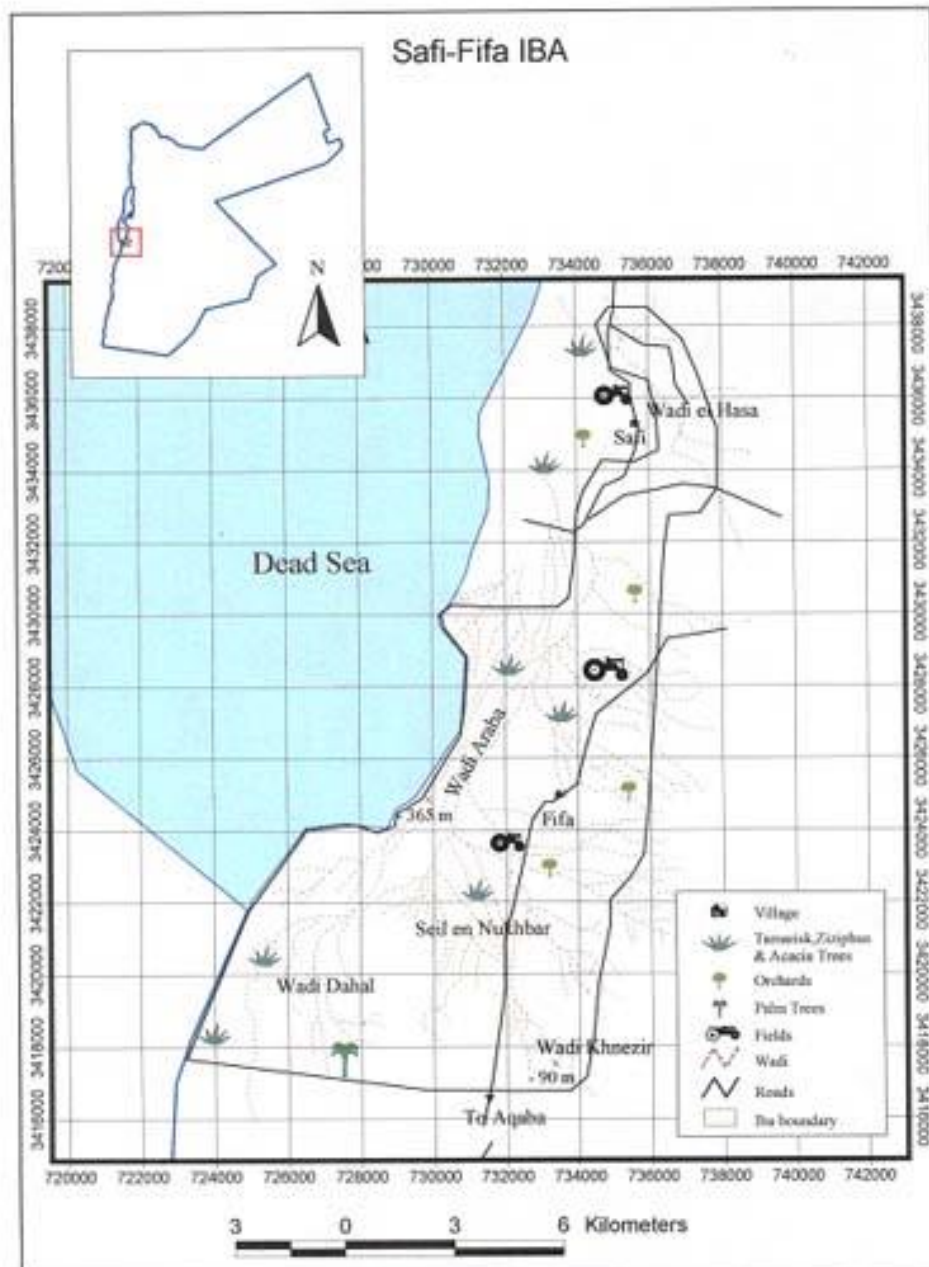


Figure 6: Safi-Fifa IBA

(e) Wadi Mujib

Importance:	IBA (Criteria: 1, 2III, 3, 4, 6), Nature Reserve managed by the RSCN, captive breeding and re-introduction of Ibex
Protection Status:	Partially Protected (Al Mujib Nature Reserve)
Sensitivity:	High
Rarity:	High

Mountainous, rocky, sparsely vegetated desert, with cliffs, gorges and deep wadis cutting through plateaux (see **Figure 7**). Perennial, spring-fed streams flow down wadis to the shores of the hyper saline Dead Sea. The streams are lined with Oleander and Tamarix thickets and reeds with some scattered wild palm trees. The main land use is tourism and mining in the lower areas and farming and grazing at higher altitudes. Water resources are threatened by water extraction and diversion. There is a programme for captive breeding and re-introduction of Ibex in the Mujib Nature Reserve. Breeding birds include Lesser Kestrel, Sooty Falcon,

Barbary Falcon, Lanner Falcon (possible), Egyptian and Griffon Vultures (probable), Bonelli's Eagle, Long-legged Buzzard, Chukar, Sand Partridge, Hume's Tawny Owl (probable), Smyrna Kingfisher, Little Swift, Fan-tailed Raven, Mourning, White-crowned Black-eared and Hooded Wheatears, Blackstart, Arabian Babbler, Tristram's Grackle, House Bunting and Sinai Rosefinch. Migration is a great event at Mujib with thousands of Levant Sparrow Hawk, Steppe Buzzard and White Stork passing over yearly.

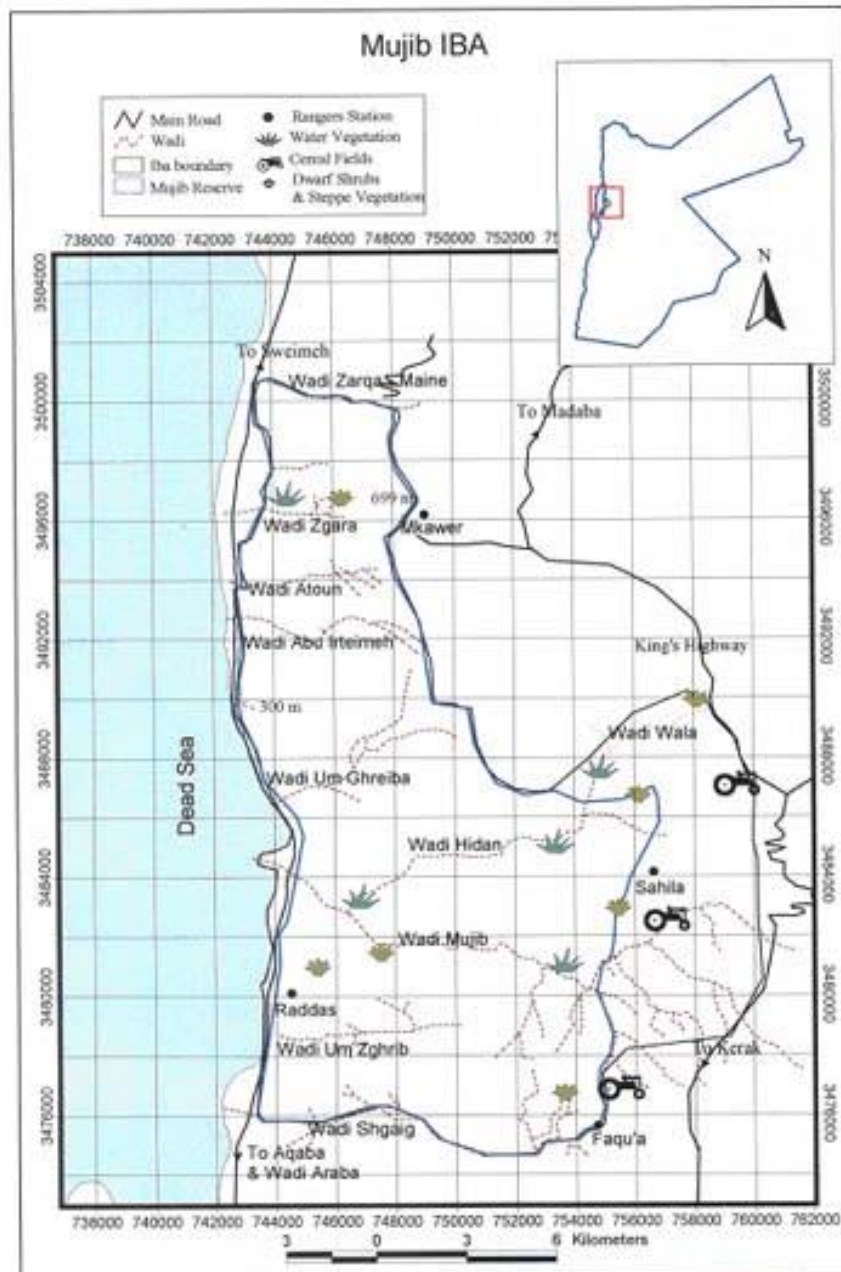


Figure 7: Mujib IBA

(f) Wadi Bin Hammad- Haditha

Importance:	IBA (Criteria: 1, 2III, 3, 4, 6), Nature Reserve managed by the RSCN, Biological Corridor
Protection Status:	Not Protected
Sensitivity:	High
Rarity:	High

Rocky, mountainous slopes cut by a wadi running to the Dead Sea at Ghor Haditha (see **Figure 8**). The altitude of this site, which lies north of Karak, ranges from 900 above Sea level to 400 m below Sea level. Ground water levels have sunk in recent years due to over-pumping and a long drought period, consequently the stream in the wadi dries out in summer. Remnants of natural vegetation mainly Acacia trees do occur in the area. The area is used mainly for agriculture, both at high altitudes and near the shores of the Dead Sea. Breeding and resident birds include Lesser Kestrel and Bonelli's Eagle (probable), Short-toed Eagle, Long-legged Buzzard, Sand Partridge, Turtle Dove, Yellow-vented Bulbul, Alpine Swift, Red-rumped Swallow, Arabian Babbler, Tristram's Grackle and Dead Sea Sparrow. Spring raptor migration involves significant numbers of Egyptian Vulture (may breed in the site), Steppe and Honey Buzzards and Levant Sparrow Hawk.

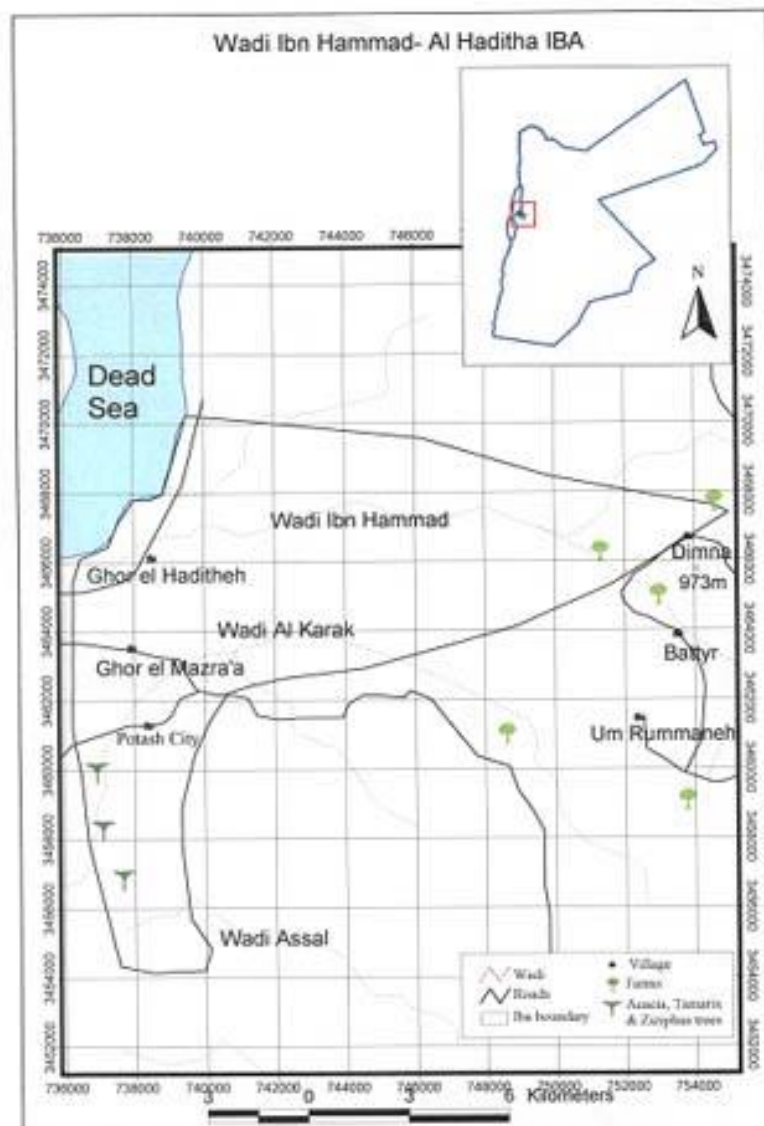


Figure 8: Wadi Ibn Hammad- Al Haditha IBA

(g) Dana

Importance:	IBA (Criteria: 1, 2III, 3, 4)
Protection Status:	Not Protected
Sensitivity:	High
Rarity:	High

At the centre of the site lies Wadi Dana, a scenically beautiful, major wadi of the southern rift margin flowing from the high Sharrah Mountains down to the Rift valley (Wadi Araba) at sea level (see **Figure 9**). The main use is grazing which is causing local habitat degradation and soil erosion, while agriculture is practiced at higher elevations and locally in Wadi Araba. There is cement factory at Rashadiya and mining at Jebel Sarab is causing local habitat destruction. At least 80 bird species breed representing four different biogeographic origins. These include Lesser Kestrel, Bonelli's, Short-toed and Verraux's Eagles, Griffon Vulture, Hume's Tawny and Eagle Owls, Hooded and Isabelline Wheatears, Dunn's, Bar-tailed and Short-toed Larks, Woodlark, Tawny and Long-billed Pipit, Arabian, Upcher's and Orphean Warblers, Palestine Sunbird, Arabian Babbler, Tristram's Grackle, House and Cretzchmar's Bunting, Sinai Rosefinch and Fan-tailed Raven. The site holds the only breeding population of Syrian Serin in Jordan, and probably up to 50% of the world population of this species, which is endemic to the Near East. There is huge raptor migration in spring, which may total up to 100,000 birds per season including Egyptian Vulture, Imperial, Steppe and Lesser Spotted Eagles, but most numerous are Levant Sparrow Hawk, Honey and Steppe Buzzards. Other migrants or winter visitors include Wryneck, Cyprus and Menetries Warblers, Rock Bunting, Hawfinch and Red-fronted Serin.

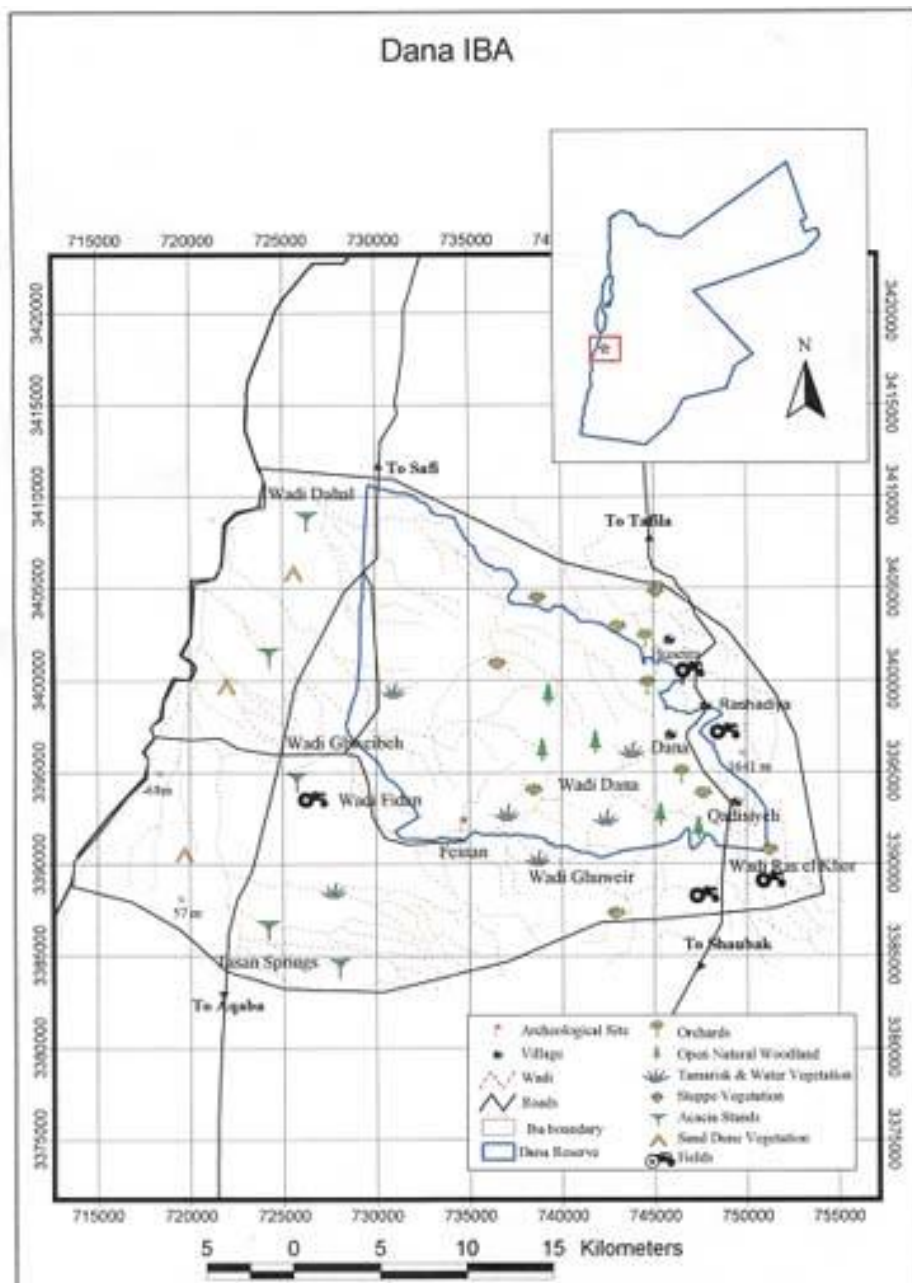


Figure 9: Dana IBA

(h) Wadi Araba

Importance:	IBA, Biological Corridor and significant portion (Qatar) area is a proposed protected area by the RSCN
Protection Status:	Not Protected
Sensitivity:	High
Rarity:	High

The site extends from Fufa south of Dead Sea to Aqaba and comprises of desert sand dunes, gravel outwash plains and mudflats (see **Figure 10**). There is some bush land and extensive stands of Acacia present on adjacent alluvial fans. Other Marsh species include *Juncus* sp. Wild palm and *Nitraria retusa*. The climate of the site is arid subtropical and thus differs from the more continental arid climate of the eastern deserts. Extensive sand dunes dominated by *Haloxylon persicum* are a major habitat type in the area. The avifauna includes Houbara (resident or winter visitor), Sand partridge, Hoopoe and Bar-tailed Larks, Spotted and

Crowned Sandgrouse, Little Green Bee-eater, Hooded Wheatear, Blackstart, Arabian Warbler, Tristram's Grackle. The Sinai Rosefinch breeds in neighbouring mountains but visits the site in winter. Migrants include Lesser Kestrel, White and Black Storks, Egyptian Vulture, Griffon Vulture (non-breeding resident/visitor), Steppe Eagle and Black Kite.

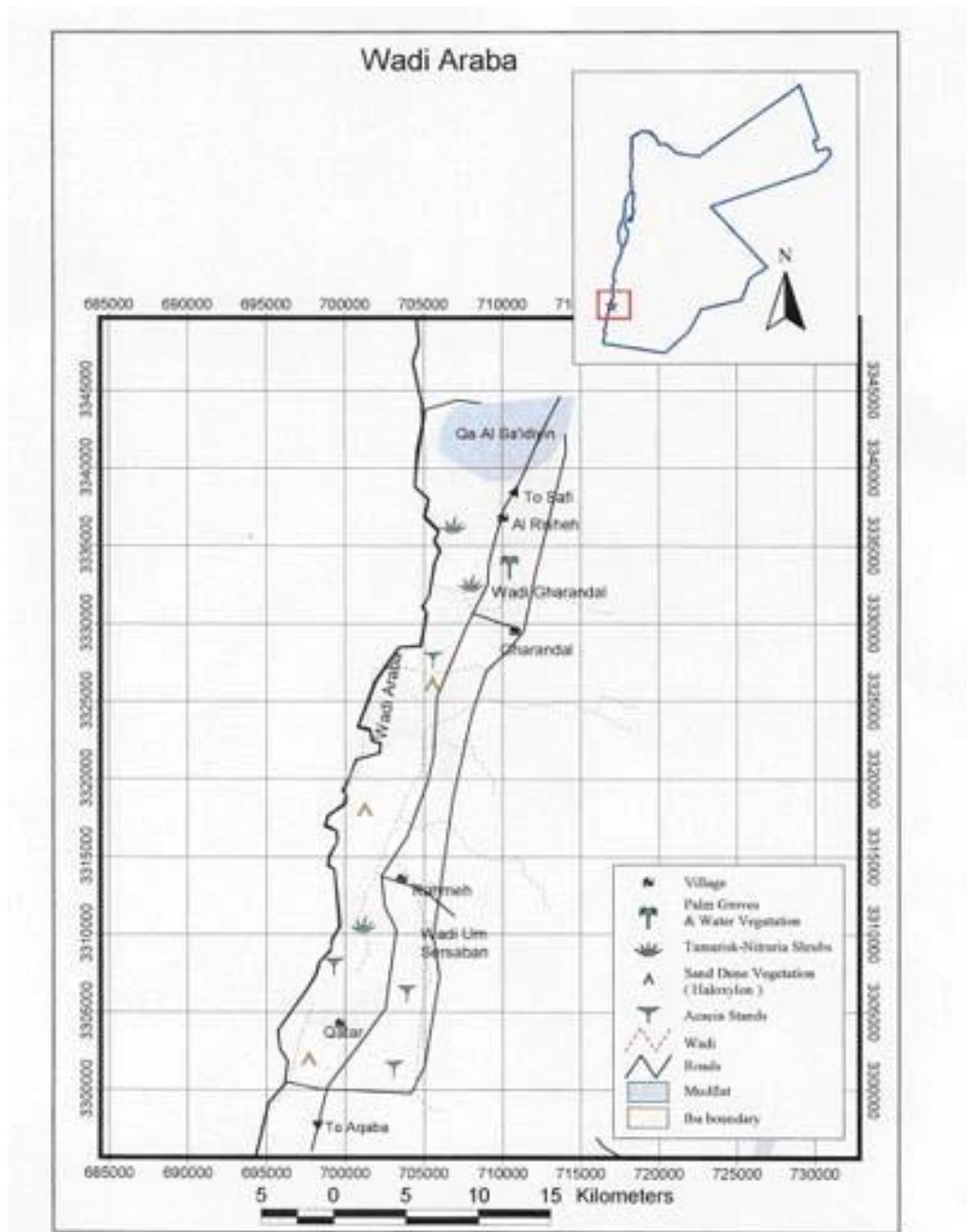


Figure 10: Wadi Araba IBA

2.2.4 Wetlands in the Jordan Valley

Nineteen wetlands exist in the Jordan Valley of which thirteen wetlands are considered as important ecological sites. These sites are shown in **Figure 11**.

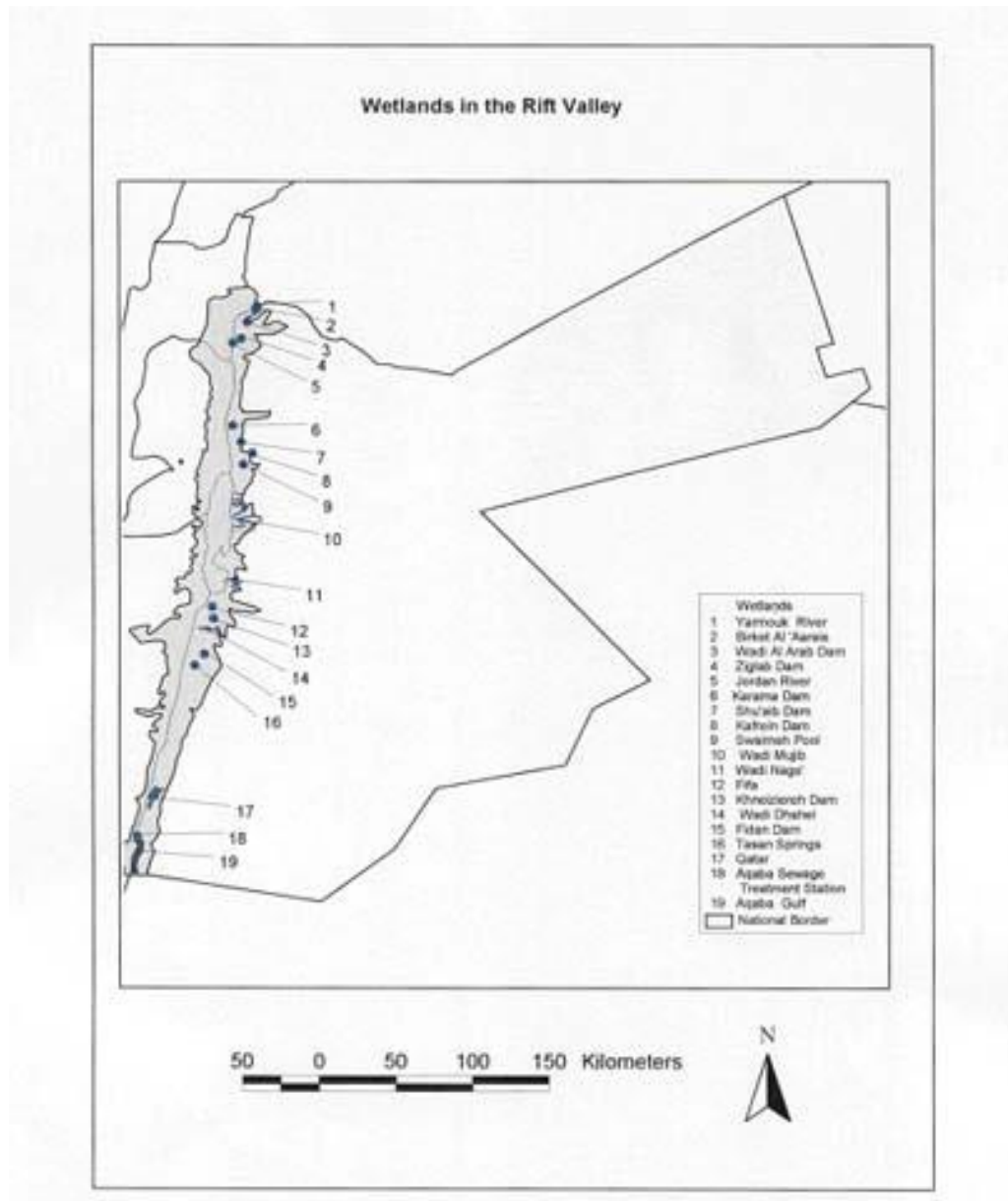


Figure 11: Wetlands in the Jordan Valley

2.2.4.1 North Jordan Valley

(a) Yarmouk River Basin including Arais Pool

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 *Ketupa zeylonensis* (rare) , *Fulica atra* (breeding), *Gallinula chloropus*, *Anas crecca*, *Ardea cinerea* , *Ardea purpurea*, *Bubulcus ibis*, *Vanellus vanellus*, *Alcedo atthis*, *Larus ridibundus*, *L. melanocephalus*, *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.

The area lies under the jurisdiction of Jordan Valley Authority, and is considered as a military zone. Occasional hunting occurs. There is intensive cultivation of fruits and vegetables in the North Jordan Valley.

(b) Wadi El Arab

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. 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.

(c) Wadi Ziqlab (Shurhabil Ben Hassaneh Dam)

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 cinerea*, *Nycticorax nycticorax*, *Ixobrychus minutus*, *Egretta garzetta* and others.

Various spring issue along the Wadi Ziglab with a total discharge of some 5 MCM/ year. In addition Wadi Ziglab drains another 5 MCM/year of floodwater. A dam was constructed in Wadi Ziglab with a total capacity of 4.3 MCM in 1966 and the 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.

2.2.4.2 Middle Jordan Valley

(a) Zarqa River Basin (King Talal Dam)

The main important areas for waterfowl within the Zarqa Basin are respectively King Talal Dam, and Khirbet As-Samra Sewage plant treatment station, both 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*, *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 Zarqa 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.

(b) Wadi Damia, Kibed Pool, Kafraïn Dam, Shuneih Dam, Suweimah Pool

Vegetation becomes less common and scarce in the middle Jordan Valley areas due to the site elevation (200 a.s.l.). The dominant vegetation cover is phragmites, 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.*, *Aphanius spp.* Observed waterfowl

are: *Gallinula chloropus* (Breeds), *Rallus aquaticus*, *Prozana prozana*, *Himantopus himantopus* (Breed), *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 scirpaceus* (Breeds), *Charadrius dubius*, *Francolinus francolinus*, *Anas crecca*, *Anas querquedula*, *Larus ridibundus*, *Alcedo atthis* (Breeds) , *Ciconia ciconia*, *Fulica atra*, *Bubulcus ibis*, *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.

2.2.4.3 South Jordan Valley

(a) Wadi Mujib

Elevation ranges from 1,100 m a.s.l. to 400 m b.s.l., the rocks forming the catchment area consists of fractured limestone, dolomites, shales, and 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.*, *Hemigrammacopoeta 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 Mujib is vulnerable to the effect of over-pumping and increasing salinity. Recently (1993) pumping projects have started on some of its main streams.

(b) Qa Al Taybeen and Qa Al Omareen

Two seasonally flooded mudflats located in Wadi Araba. These mudflats are surrounded by beds of *Phragmites spp*, *Juncus maritimus* and scattered *Phoenix dactylifera*. Main indigenous animals are: *Barbus spp.*, *Capoeta damascena*, *Gara spp.*, *Hemigrammacopoeta 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*.

2.3 Grazing in the Valley

It has been documented that the economy in the Jordan Valley is dominated by irrigated agriculture and fish farming in the area north of the Dead Sea, general tourism, health tourism and large scale of mineral extraction at the Dead Sea itself, limited specialized farming and nomadic grazing in the area below the Dead Sea. Bedouin tribes use portions of the area between Dead Sea and the Red Sea for seasonal grazing by camels, goats and sheep. As a

result of low rainfall, expansion of agricultural projects, the settlement of Bedouins and availability of civilian and military employment, herding and pastoral activities have been in decrease.

The grazing patterns in the north and middle parts of the Valley are quite different in nature and effect from the grazing patterns in the south parts of the Valley where:

- Grazing in the southern parts is more dependant on the natural vegetation, which is scarce and mainly concentrated within the riparian zones of the wadis and streams. Also, in the southern parts, up to 85% of the animal feed is from the natural vegetation and up to 20% is provided as supplementary feed. The settlement projects of the Bedouins resulted in concentrating the grazing pressure within the settled zones and its surroundings. Goats and camels are favoured on sheep's since they are more adapted to the harsh environmental conditions.
- Grazing in the northern and middle parts of the Valley include growing sheep's, goats and cows, range vegetation provides with up to 75% of the feed consumed by these animals, supplementary feed and agriculture waste provides with up to 30% feed.

One of major problems facing the Development of Rangelands within the Jordan Valley is the ambiguity of responsibilities for managing the rangelands and forestlands especially in the north parts of the Valley starting from the Jordan University Farms and up north. This problem results in almost total ignorance of this area and the mismanagement and the loss of forests and rangelands. Prolonged heavy grazing changes rangeland quantitatively and qualitatively. Quantitatively, it results in fewer and smaller plants. Qualitatively, it results in a decrease in the most palatable and nutritious plants relative to unpalatable plants and those lacking nutrients.

Other major problems include the plastic waste disposal and dispersal and the soil erosion problem caused by the overgrazing and woodcutting. The area of rangelands estimated in the valley to be almost 6% of the country total area (app. 5,000 km².) at both the eastern slopes of the valley and the dry region of Wadi Araba. These areas are characterized by warm and dry climate and low rainfall. The eastern scrubs are a priority area for land development in term of soil conservation measures at slopes and therefore can increase its fodder productivity. The area of wadi Araba has been considered of the lowest priority for development as pastureland. However, these areas can be developed at areas where water availability allows irrigated fodder production and therefore good browse can be found in larger wadis.

2.4 Woodcutting in the Valley

Overgrazing can be witnessed almost everywhere in the Valley; however, the impact is more apparent on the Humra area in the northern parts where the deciduous oak and Kharob are significantly impacted. While in the southern parts the important Arak and Acacia stands are significantly affected. These sites are proposed protected areas. Unfortunately, the overgrazing is usually associated with aggressive woodcutting; consequently, the problem is much complicated.

The overgrazing and woodcutting problems are more significant and require more attention in the southern parts since the vegetation cover is already scarce and the climatic conditions are harsh. Another sensitive site is the Tamrix woodland north to the Dead Sea, this area is very important and suffers from heavy woodcutting and grazing, more attention to this area is need thereto; conserve its uniqueness and rarity.

2.5 Planned Conservation Projects

The conservation of the biological and environmental resources in the Valley is of major concern for several governmental and nongovernmental organizations. In addition to the existing nature conservation projects, two planned projects were recently announced, the first project is the Integrated Ecosystem Management of the Jordan Valley and the other one is the Friends of the Earth – Middle East proposal for the declaring the Dead Sea area as a Man and Biosphere Reserve.

Recently the Royal Society for the Conservation of Nature (RSCN) expressed their willingness to initiate and sustain Integrated Ecosystem Management in order to assure sustainable development combined with the conservation of natural resources and the protection of the environmental health. The RSCN received a World Bank Block B fund value of 300,000 US\$ to partially start implementing the activities of integrated ecosystem management and to prepare the Block C proposal to be submitted to the World Bank in order to receive a fund in millions of dollars thereto fully implement and monitor the implementation of the ecosystem management activities. The Block B Grant Proposal is provided in **Annex 1**.

Friends of the Earth Middle East (FoEME) have been actively conducting research and promotion activities among their principle objective of a trans-boundary Dead Sea Basin Biosphere Reserve. The proposed project stands on technical and political objectives as follows:

- **Technical Objectives:**

- To develop and implement a management plan for the entire Dead Sea Boundaries (DSB) in order to conserve and restore its unique ecosystems and to foster integrated regional sustainable development. The plan would also address issues of resources and projects, which impact, or are impacted by the Basin although they are technically outside its geographic boundaries.
- To strengthen the involvement and participation of local communities and other stakeholders in planning and management of the DSB and its resources.
- To promote the creation of a trilateral management authority for the DSB.
- To promote education, training and research in order to support conservation and sustainable development of DSB resources.

- **Political Objectives:**

- To promote cooperation between Israeli's, Jordanian's and Palestinian's through coordinated research, planning and management of mutually shared resources in the Dead Sea Basin.
- To promote the fair share of benefits and costs resulting from the conservation and use of the DSB's resources.
- To promote peace through sustainable development in the Dead Sea region.

FoEME proposed different boundaries using different combinations based on the integrity of the physical and biological environment factors. Details on this project are provided in **Annex 2**: FoEME concept document on the project.

Also, FoEME has carried out interesting economical analysis of different water uses affecting the Dead Sea Basin.

On the other hand, the Ministry of Environment, Ministry of Agriculture and the Jordan Valley Authority are preparing to implement a promising environmental solution for managing the problem of flies and insects through treating the underlying factors for the problem and other associated effects, mainly through promoting and enforcing adequate management of organic fertilizers and agrochemicals.

2.6 Comments on the Fish Farming Pilot Project in the Valley

Fish farming holds significant potential for economical development projects in the Jordan Valley. Some projects already exist with variable scale of production capacity and potential development, as well as variability if the operation and management systems adopted, including open and closed systems.

The proposed pilot project at Karamah dam is proposed to encompass other marginal, integrated agricultural, industrial and touristic development activities. These activities include farming alpha alpha to be used as animal feed, animal production (cows and sheep's), fish and fishing equipments industries, and ecotourism activities (bird hides, restaurant, etc...).

Such projects would hold positive socio-economical and environmental impacts. Also negative impacts are anticipated. It is very important to carry out a comprehensive EIA for the project prior to the project launch, and to prepare adequate environmental management plan that recognizes the following issues of concern:

- **General management concerns:**
 - Tourist attraction
 - Fish farming system; if closed or open, natural, intensive, semi intensive or extensive system
 - The project site and design
 - Water quantity and quality required (including the sources of water and the exploitation of saline water)
 - Exploitation of arable lands
 - Pollution (including prevention and control activities)
 - Fish nutrition, feeding, use of fertilizers, hormones and chemicals
- **Other environmental concerns:**
 - The positive biological control created by the farmed fish
 - The impact of attracted birds by the site and the impact of the birds control techniques (hunting, nets, ...) on the biological environment
 - Introduction of alien species
 - Methods of disposing the ponds water and waste management
 - Fish diseases

The above mentioned issues are not the only concerns that should be taken into account; it would be the responsibility of the EIA study to cover all significant impacts anticipated to occur by the project.

2.7 Environmental Threats

As elsewhere in the world, the natural environment of the Jordan Valley is being severely impacted by development and population growth. Rapid industrialization has resulted in high levels of pollution from pesticides, herbicides, factory waste and sewage, which affects all inhabitants. Also, industries south of the Dead Sea resulted in severe deterioration in biological habitats at least those exploited for potash and salt mining (drying ponds). Different ministries were approached for data on pollutants, pattern of pollution and quantification of pollution, but such data are not available.

Habitat loss and degradation have been widespread throughout the Valley, especially from agriculture. By the 1950s, the marshes of the northern Jordan Valley were totally drained, resulting in disappearance of more than 20 breeding species including: great crested grebe, gray heron, ruddy shelduck, white headed duck, white tailed eagle, marsh harrier, spotted eagle and black tern, little grebe, little bittern, purple heron, marbled duck, ferruginous duck, black winged stilt, common tern, pied kingfisher, yellow wagtail, white wagtail, cetti's warbler, savi's warbler, moustached warbler, great and reed warblers.

The habitats in and around reservoirs and ponds are ever changing, water level may change rapidly, and the vegetation on the banks and near canals is often controlled. The rapid changes, especially when they occur during breeding seasons, greatly affect breeding success and the stability of populations. Irrigated cultivation on the other hand had little significance until the beginning of the 1960's. The irrigated areas were scattered around the water sources and along the streams. Main expansion took place in the Jordan Valley where valuable water sources are available (river Jordan and Yarmouk river). The expansion of irrigated farming has reduced the winter pastureland. Some of nomads have become farmers or farm workers.

The lack of water and an ever-increasing demand for this resource is causing the most intricate environmental problems in Jordan. Over-pumping of water resources is leading locally to the drying out and loss of unique wetland habitats many birds depend on. Accessible water resources also attract and support wildlife of all surrounding areas as well as for migrating birds; the loss of water supplies thus affects all populations of wild animals in vast areas surrounding such resources.

Thousands of tons of poisonous chemicals were used in agriculture in the early 1960s. The most prominent poisons are DDT (used mainly up to 1960s), thallium (used largely, until the 1970s), floriacetamids, azodrin and others. The use of these chemicals causes both direct and indirect secondary poisoning. Many birds species, especially raptors, have been badly affected, in fact all breeding populations of raptors in the northern Jordan valley, were nearly wiped in the 1950s, and other species declined, and their range reduced. No less than habitat destruction, the continuing use of pesticides also plays a major part in upsetting the food chain, with the poisoning of predators at the top of the chain (raptors and mammalian predators), the invasion of rodents and others, or commoner birds which often become pests are actually wider and frequently on a greater scale at specific periods and at different places, thus increasing the need for use of pesticides and broadening the effects of these on raptors, thereby inducing a never ending destruction of the ecosystem in a continuously repeated cycle.

Symptoms of overgrazing is the most ubiquitous problem, leading almost everywhere in the Kingdom to the degradation of natural vegetation, increased soil erosion and consequently to the loss of habitats and of precious natural recourses. Land was cleared for agriculture and the wood was used as fuel. Today, rural and urban expansion and overgrazing are still threatening the remnant natural trees and woodlands.

Other problems with local impacts are intensification of agriculture, and mining and industrial developments. The use of pesticides in agriculture and the residues of industrial projects could have a great impact on birds, especially on the populations of migrating species.

Threats that are challenging its biodiversity in specific and the environment as a whole can be summarized as follows:

- Loss of biodiversity from habitat shrinkage due to intensive agricultural farming, mono-culturing practices and urban expansion.
- Over use of water resources including surface and ground water, through intensive water harvesting.

- Water and soil contamination by agrochemical, industrial and urban sources affecting both terrestrial and aquatic biodiversity of the area in particular endemic fish and invertebrates.
- Expansion of urban and transportation activities causing disturbance to local and migratory species of birds.
- Increased accessibility to remote areas.
- Degradation of forest resources such as the natural vegetation of *Acacia radiana*, *A. tortilis*, *Ziziphus* spp., *Moringa peregrina*, *Tamarix* spp, *Salvadora persicum*, *Haloxylon persicum* and others.
- Loss of endemic fish due to over pumping of certain permanent springs such as the endemic to Jordan *Garra ghorensis*.
- Illegal hunting of mammals such as *Vulpes* spp., *Gazella dorcas*.
- Degradation of wetland and loss of their waterfowl.
- Loss of special sand dune habitats and its dependent species as the *Felis margarita*, *Fennecus zerda*, *Jaculus jaculus* and *Cerastescerastes*.
- Loss of special habitats of the Dead Sea and the effect on its endemic and relict species such as the *passer moabitiucs*, *capra ibex nubiana*, *pseudo trabilos sinaita*, and others.
- Loss of the special habitats and its related biodiversity in the Jordan valley and loss of its indigenous endemic fish and other aquatic resources.
- Introduction of new mammalian exotic species namely *myocastor copuy* and invasion of feral animals to natural habitats.
- The retraction of the Dead Sea and the associated loss of habitat, migration of the unique oasis systems, and also the ever increase in sinkholes dispersion.

2.8 Recommendations

- Strengthen and update land use in the area.
- Monitor usage of agro-chemicals and pesticides, and maintain information system on this regard.
- Set up a net work of protected areas in the Jordan Rift Valley.
- Update, rehabilitate and establish legal status of the important wetland and bird areas of the Jordan Rift Valley.
- Strengthen by-laws and regulations of the Environmental Law Number 12 to include endangered species and their habitats.
- Conserve and mange endemic and relict species and their habitats such as sand dune and Dead Sea and Jordan River habitats, establish their status as world heritage and bio-sphere reserves.
- Improve management and conservation of forest resources of the Rift valley. Adequate coordination and cooperation with the Ministry of Agriculture and other governmental and non-governmental bodies is necessary in order to ensure maximum benefits and to avoid any ambiguity of conservation responsibilities nor the duplication of efforts.
- Monitor agricultural practices of the Valley and encourage sustainable development practices.
- Develop sustainable fisheries and other socio-economic projects for the benefit of the local people. Integrated fisheries with other marginal farming and industrial projects can be operated in the valley if adequate environmental management plans are prepared and enforced.
- Improve enforcement of hunting laws and regulations.

- Regulate grazing based on the pastoral capacity of rangelands and enforce strict prohibition of woodcutting. This would include:
 - To control grazing activities based on the grazing capacity of available rangelands
 - To rehabilitate overgrazed rangelands
 - To delineate rangelands and other areas suitable for agriculture expansion
 - To enhance more communication and coordination between responsible authorities
 - To establish Agriculture Research and Training Centre (Training, Awareness and research targeting farmers, employees and other groups) – Deir Alla or close to the Jordan University Farms are potential locations.
 - To Declare Qater, Mas'ada Mountain and Ghore Al Safi as reserves in full coordination and cooperation with local communities.
- Improve the national water use policy for the Rift Valley to include water quality and quality to become suitable for aquatic and terrestrial biodiversity.
- Implement and develop protection laws related to hunting regulations, so that IBAs and all species listed as important in the IBA criteria enjoy special protection.
- Develop and implement protection laws aiming on the conservation of natural resources and the planning of rural, urban and industrial developments in accordance with nature conservation.
- Implementation of primary legislation approved by the national environmental strategy, especially those that address protection of non-private lands.
- Enforce conducting EIAs for the proposed projects, environmental audit to the existing sources of pollution and the implementation of well established environmental management programs and systems by all economical activities including industries, agriculture (Intergarted Pest Management and water conservation tools for example), and the tourism sector.
- Evaluate the existing waste (solid and liquid) management within the Valley and establish more adequate and environmental sound Integrated Waste Management Projects (ISWM).
- Enforce suitable agricultural techniques in southern Ghore (especially at the sand dunes areas) that prevent soil erosion whenever agricultural activities are operated.
- Develop and promote ecotourism and environmental friendly tourism projects as sustainability and economical development tools in the Valley. This include issues related to the selection of the tourism destinations, the nature of the tourism facilities and services provided, nature conservation aspects, water conservation techniques, and many other environmentally sound tourism activities.
- Rehabilitation of the quarries, mining and excavation sites, and establishment solid waste landfills.
- Raise public awareness on bird conservation and the importance of IBAs.
- Enhance co-operation and co-ordination between different governmental and non-governmental institutions for better protection and comprehensive management of IBAs, including special habitat and species management actions.
- Encourage sustainable use of land and natural resources.
- Protect water resources from pollution and raise awareness of local communities in the proper use of such resources.
- Enhance the involvement of local communities in management plans aiming on protecting biodiversity and natural resources, and improving the socio-economic situation and life quality in IBAs and their surroundings.
- Build up local capacities for monitoring existing IBAs and surveying new sites to identify further IBAs in the future.

2.9 Laws

The first law with provision to establish protected areas was the Agricultural Law, ratified in 1927 and amended 1951 and 1973.

The Law of Protection of the Environment was referred to the Parliament for enactment in 1995, but has not yet been ratified. It provides a framework and mechanism under which detailed legislative articles can be prepared. As the country's only environmental law, however, it has serious shortcomings.

2.10 Policies

The National Environment Strategy for Jordan was produced in August 1991, and this was supplemented by the National Environmental Action Plan (NEAP) in 1996 and the Biodiversity Strategy and Action Plan in 2001.

3 DEAD SEA CARRYING CAPACITY

3.1 Introduction

The Dead Sea Area is one of the most spectacular, important and internationally recognized tourism destinations in Jordan and the region. On the other hand, the Dead Sea environmental settings are unique and yet sensitive to natural and man-made changes and developments.

This section presents to an attempt to roughly estimate the tourism carrying capacity of the Dead Sea Coast area, in light of the environmental sensitivity of the site. "Tourism Carrying Capacity" is an approach to tourism management whereby levels of visitor activity or development in a destination must be maintained within acceptable limits.

It is important to recognize that several estimation techniques are known, most of which are objective and require longer time than the time allocated for this project and also require extensive field work and consultations with related stakeholders. The adopted methodology for this study was developed by the study team in order to conduct the most precise estimate within the short time available.

3.2 Estimation Methodology

The adopted approach to estimate the tourism carrying capacity of the Dead Sea area included the following activities:

- 1- The study area was defined as the area stretching between Wadi Ain El-Helwa north of the Dead Sea and Wadi Ibn Hammad in the south with a total width of 1,500 meters east of the coast.
- 2- Areas of ecological, archaeological, and/or environmental sensitivity were identified to facilitate the grouping of the coast areas based on the allowed tourism activities, for example, sensitive ecological habitat, protected areas, wadis and wadis riparian habitats, sinkholes ...etc.
- 3- The overall study was divided into five main zones; each zone holds quite different potential for tourism development, and also exhibit different level of microenvironment sensitivity to development.
- 4- Tourism activities (land uses) were defined and grouped into five main categories, taking into account the environmental and archaeological conservation parameters, and the area available for each category. **Table 5** presents to these categories.
- 5- For each category, the tourism capacity in visitor/bed unite per km² were identified based on the World Trade Organization (WTO) references whenever applicable and based on logical judgment whenever not available from WTO. **Table 5** presents to these capacity assumption (in visitor or bed unite per km²) for each category.
- 6- The total area measured for each category was estimated using GIS tools. Measured areas and the suggested tourism category for each area are presented in **Table 6** and shown in **Figure 12**.
- 7- The tourism capacity was finally calculated by multiplying the measured tourism activity areas with the capacity assumption for each tourism category.

Table 5: Tourism categories and capacity assumptions

Category Code	Category Name	Environmental Sensitivity	Type of Allowed Tourism Activities	Number of Visitors per km²
T1	Limited Nature Based Tourism Area*	Very Sensitive ecological and archaeological sites excluding the wadis and the wadis riparian habitat (1,000 meter width zone)	Tourist Accommodation (Ecotourism and / or Youth Tourism Camps)	100
T2	Nature Based Tourism Area**	Sensitive ecological and archaeological sites excluding the wadis and the wadis riparian habitat (1,000 meter width zone)	Campsites, Hiking, Ecotourism, Bird watching)	4,000
T3	Low Density Picnicking Area**	Moderately sensitive ecological and archaeological sites excluding the wadis and the wadis riparian habitat (1,000 meter width zone)	Public Beaches and Walk ways	6,000 to 20,000 (Average 13,000)
T4	Hotels and Villas***	Non or least sensitive ecological and archaeological sites excluding the wadis and the wadis riparian habitat (1,000 meter width zone)	Tourist Accommodation	613
T5	Holiday Housing****	Non or least sensitive ecological and archaeological sites excluding the wadis and the wadis riparian habitat (1,000 meter width zone)	Domestic Tourists Accommodation	1,000
* Based on the experience of Dana Nature Reserve				
** As per of WTO				
*** Based on the Coming Soon Scenario presented in the Economical Section				
**** Assumption				

Table 6: Measured areas for each zone and tourism category

Zone/Parcel Plot No.	Zone Area (km ²)	Area per Category										Sub-Total Area
		T1		T2		T3		T4		T5		
		% of the Total Area	Area under this Category	% of the Total Area	Area under this Category	% of the Total Area	Area under this Category	% of the Total Area	Area under this Category	% of the Total Area	Area under this Category	
Zone 1: North Coast (Parcels 25, 31 and 88)	2.563407	100%	2.56341		0		0		0		0	2.563407
Zone 2: the stretch between the wadi and Parcel No. 70, excluding Parcels No. 25, 31, and 88	12.61606		0		0	25%	3.15401	50%	6.30803	25%	3.15401	12.616058
Zone 3: the stretch between Parcel No. 70 and Wadi Zarqa Main	12.37151		0		0	60%	9.27864	40%	6.18576		0	15.4643925
Zone 4: the stretch between Wadi Zarqa Main and Wadi Ash Shaqiq (Wadi Al Mujib Reserve)	39.15543	100%	39.15543		0		0		0		0	39.155433
Zone 5: the stretch between Wadi Ash Shaqiq and Wadi Ibn Hammad	25.28248		0	75%	18.9619		0		0	25%	6.32062	25.2824755

Figure 12: Locations of Zones 1, 2, 3, 4 and 5

Figure 12: Locations of Zones 1, 2, 3, 4 and 5

Figure 12: Locations of Zones 1, 2, 3, 4 and 5

3.3 Results

As **Table 5** indicate, five different tourism-bases land use categories were identified, those categories vary with respect to the nature of tourism activities to be allowed, and to the environmental and archaeological sensitivity of the areas applicable to each category. For example, in areas recognized as very sensitive ecological or archaeological sites, only limited nature-bases tourism activities should be allowed, where constructing roads, hotels or house should be prohibited in order to maintain the unique character of the area and to promote sustainable tourism development. On the other hand, constructing hotels, villas or any other holiday housing projects may be allowed within areas of least or no sensitivity.

Preliminary zoning was carried out in order to estimate areas falling under each category. **Table 6** presents to these zones, and to the relevant percentage and area of the total zone area to be utilized by each tourism category.

In summary to **Table 6**, the total area of all zones was found to be 95.082 km² most of which is located within zone four which stretches between Wadi Zarqa Main and Wadi Ashqig in front of Mujib Reserve, and zone five which stretches between Wadi Ash Shaiq and Wadi Ibn Hammad.

The Tourism Capacity for each zone was calculated based on the above mentioned measures and assumptions. **Table 7** summaries to these calculations.

3.4 Conclusion

It can be concluded that the overall tourism carrying capacity of the Dead Sea Area coastal area (with a total width of 1,500 meters) goes up to 258,777 visitors. This figure refers to all possible tourism activities, however, the study area can hold up to 18,134 bed unit.

It is important to recognize that these estimates are only indicative. For the sake of more site-specific and environmentally-sound management, it is recommended to conduct elaborated carrying capacity study that takes into account the concerns of all related stakeholders, and would ensure surveying visitors opinions and expectation over at least one year (four seasons).

Table 7: Estimated tourism carrying capacities in Bed Unite

Area #	Area Name or Parcel Plot No.	Total Study Area (Km ²)	Tourism Capacity (in BU)					
		Tourism Category	T1	T2	T3	T4	T5	Subtotal Capacity (BU) per Area
		Capacity per Km ²	100	4000	13000	613	1000	
Area 1	North Coast (Parcels 25, 31 and 88)	2.563407	256.341	0	0	0	0	256.3407
Area 2	the stretch between wadi.... And Parcel No. 70, excluding Parcels No. 25, 31, and 88	12.616058	0	0	41002.2	3866.82	3154.01	48023.02478
Area 3	the stretch between Parcel No. 70 and Wadi Zarqa Main	12.371514	0	0	120622	3791.87	0	124414.1305
Area 4	the stretch between Wadi Zarqa Main and Wadi Ash Shaqiq (Wadi Al Mujib Reserve	39.155433	3915.54	0	0	0	0	3915.5433
Area 5	the stretch between Wadi Ash Shaqiq and Wadi Ibn Hammad	25.2824755	0	75847.4	0	0	6320.62	82168.04538
Subtotal Capacity per Tourism Category		91.9888875	4171.88	75847.4	161624	7658.69	9474.63	258777.0847

4 ARCHAEOLOGY

This section of the report is primarily concerned with the salient archaeological and cultural heritage sites located in the Jordan Valley. This section also presents to the prominent threats and challenges to the conservation of these sites, and suggests a number of potential conservation measures.

Around 1,300 sites were recorded by the Department of Antiquities (DOA) in the valley, most of which are survey sites. The recorded sites vary with respect to the historical period they belong to, conservation status, significance and sensitivity. Extensive field and office research might be necessary to assess these sites and to elaborate detailed conservation measures for each.

4.1 Salient Archaeological and Cultural Heritage Sites in the Valley

56 sites were identified by the study team as salient archaeological and cultural heritage sites. These sites were also discussed with the DOA representative, Mr. Abdelsameia Abu Dieh, and with Dr. Mohamad Waheeb, the famous Jordanian archeologist who discovered the Baptism Site. **Table 8** summarizes those sites.

Table 8: Sites identified as salient archaeological and cultural heritage sites

No.	Site Name (As presented in the JADIS* list)	Other Names	Significance	Threats	Period
1.	UMM QAIS	Gadara	High Value Site.	Protected, natural threats.	Classical
2.	TELL EL-ARBA'IN	None	High Value Site.	Looting, natural threats.	Bronze Age
3.	EL- HUSN	Tall Al-Husn	High Value Site.	Looting, natural threats.	Classical
4.	TABAQAT FAHL (PELLA)	Pella	High Value Site	Partially protected.	Roman + Byzantine
5.	TELL ABU KHUS	Abu Al-Khas	High Value Site.	Agriculture activities, looting, natural threats.	Bronze Age
6.	TELL ESH SHUNA (North)	Non	Medium Value Site.	Urban activities, natural threats.	Bronze Age
7.	TELL EL - HAYYAT	None	High Value Site.	Agricultural activities, natural threats.	Bronze Age
8.	TELL SHERHABIL BEN HASSNEH	Makam Sherhabil Ben Hassaneh	High Value Site	Looting, natural threats.	Islamic
9.	TANNUR	Khirbet Tannur	High Value Site.	Natural threats.	Nabatean
10.	TELL ABU HABIL NORTH	None	High Value Site.	Looting, natural threats.	Chalcolithic Age + Bronze Age
11.	TELL ABU HABIL SOUTH	None	High Value Site.	Looting, natural threats.	Chalcolithic Age + Bronze Age
12.	TELL EL TWAL	Tell El Twal	Low to Medium	Agricultural activities.	Unspecified Structure
13.	TELL ABU EN-NI'AJ (TOMBS)	Abu Naaj	Medium Value Site	Agriculture activities, modern cemetery, natural threats.	Bronze Age

No.	Site Name (As presented in the JADIS* list)	Other Names	Significance	Threats	Period
14.	TELL EL - KHARAZ	Abu Al-Kharaz	High Value Site.	Agriculture activities, looting, natural threats.	Bronze Age
15.	TELL EL- MAQBARAH	None	Medium Value Site.	Agriculture activities, looting, natural threats.	Bronze Age
16.	TELL ABU HAMID	None	High Value Site.	Looting, natural threats.	Chalcolithic Age + Bronze Age
17.	TELL EL- HANDAQUQ	None	Medium Value Site.	Looting, natural threats.	Bronz Age
18.	TELL ES- SAIDIYEH	None	Medium Value Site.	Looting, natural threats.	Bronze Age + Iron Age
19.	ABU OBEIDAH	Makam Abu Obidah	High Value Site.	Protected.	Islamic
20.	TELL E L- MAZAR	None	Medium Value Site.	Looting, natural threats.	Iron Age II
21.	DIRAR TOMB	Makam Dirar	High Value Site.	Protected.	Islamic
22.	TELL DEIR ALLA	Deir Allah	High Value Site.	Close to the existing road, natural threats.	Iron Age
23.	TELL EL- FUKHAR	None	High Value Site.	Looting, natural threats.	Bronze Age
24.	TELL EL- HANDAQUQ SOUTH	None	High Value Site.	Looting, agriculture activities, natural threats.	Bronze Age
25.	TELL UMM HAMAD E L- SHARQI	None	High Value Site.	Looting, natural threats.	Bronze Age
26.	TELL UMM HAMAD E L- GHARBI	None	High Value Site.	Looting, natural threats.	Bronze Age
27.	TELL DAMIEH	None	High Value Site.	Agriculture activities, looting, natural threats	Bronze Age
28.	DAMIYEH DOLMENS	Dolmen Fields	Medium Value Site.	Agriculture activities, looting, natural threats.	Bronze Age
29.	TELL EL- MAQBARAH	None	Medium Value Site	Agriculture activities, looting, natural threats	Bronze Age
30.	SHUNAT NIMRIN	Tal Nimrin	High Value Site.	Site fragmentation by the main road, expansion of urban area, looting.	Bronze Age + Byzantine
31.	TELL GHRUBBA	None	High Value Site.	Agriculture activities, natural threats.	Chalcolithic Age
32.	TELL EDAHAB	Al Madash	Medium Value Site.	Quarry, natural threats.	Roman + Byzantine
33.	TELL EL - GHARABA	Gharabeh	Medium Value Site.	Agriculture activities, natural threats.	Byzantine
34.	TELL	Tell Esh-Sharab	High Value	Looting,	Iron Age II +

No.	Site Name (As presented in the JADIS* list)	Other Names	Significance	Threats	Period
	KUFREIN		Site.	agriculture activities, natural threats.	Classical
35.	TELL ET-TAHUNEH	None	High Value Site.	Looting, agriculture activities, natural threats.	Bronze Age
36.	TELL EL-HAMMAM	None	High Value Site.	Looting, agriculture activities, natural threats.	Bronze Age
37.	TELL EL-KHARRAR	(Baptism Site) Bethany Beyond the Jordan	High Value Site.	Protected.	Roman + Byzantine
38.	ES- SADD EL-GHARBI	Tell Barakat	Medium Value Site.	Looting, natural threats.	Early Bronze Age
39.	TELL ER-RAMA	Livias	High Value Site.	Modern cemetery, looting, agriculture activities.	Classical + Islamic
40.	TULEILAT EL-GHASSUL	Ghassul	High Value Site.	Agriculture activities, natural threats.	Chalcolithic Age
41.	EZ- ZARA OASIS (Villa and Harbour)	Callirhoe	High Value Site.	Looting, natural threats, agriculture, fragmentation by the existing road.	Roman Age
42.	Zara Archaeological Survey Site	Callirhoe	High Value Site.	Construction of new road and agricultural activities.	Roman - Byzantine
43.	MUKAWIR	Makam Jhon the Baptist	High Value Site.	Natural threats.	Roman
44.	KHIRBET ISKANDER	None	High Value Site.	Looting, agriculture activities, natural threats.	Bronze Age
45.	AS SIFIYYA	None	High Value Site.	Dam construction, agriculture activities, looting, natural threats.	Neolithic Age
46.	QASR AL RIASHI	EL QASR	High Value Site.	Natural threats.	Byzantine
47.	BAB EDH-DHRA	None	High Value Site.	Looting, natural threats.	Bronze Age + Byzantine
48.	TAWAHIN ES-S UKKAR II	Khirbet Sheikh Isa (This archaeological site is located within the borders Al Naqa'a area which also includes Al Naqa'a Cemetery)	High Value Site.	Looting, natural threats.	Byzantine + Islamic
49.	KHIRBE T `ESAL	None	Medium Value Site.	Quarry, natural threats.	Byzantine
50.	QASR ESAL/ WADI ISAL F	Rujum Isal	Medium Value Site.	Natural threats, Wadi Essal	Byzantine

No.	Site Name (As presented in the JADIS* list)	Other Names	Significance	Threats	Period
	3-2			floods.	
51.	RUJM NUMEIRA	Al-Rujum	High Value Site.	Natural threats, Wadi Essal floods.	Nabatean + Byzantine
52.	LUT'S CAVE	Deir Ain Abattah.	High Value Site.	Natural threats.	Bronze age + Byzantine
53.	FENAN	Punon	High Value Site.	Potential Mining Project, natural threats.	Neolithic + Chalcolithic+ Bronze
54.	EL NAQA'A CEMETERY	None	High Value Site.	Looting, natural threats.	Bronze Age
55.	FIFA CEMETERY	Fifa (Islamic site inside and Early Bronze cemetery outside)	High Value Site.	Looting, developmental activities and natural threats.	Bronze Age
56.	GHARANDAL		Medium Value Site.	Natural threats.	Neolithic + Nabatean+ Roman, Byzantine, Islamic

* JADIS is an archaeological data information system for Jordan in which each described archaeological site is given a reference number (code). This data system also document sites locations.

4.2 Threats and Challenges

Several threats and challenges face the conservation of the archaeological and cultural heritage sites in the Valley. The most prominent threats are:

- 1- Direct threat of destruction by the development activities (construction, quarries, dams, roads, agriculture activities, urban activities,...etc);
- 2- Indirect threat caused by the vibration and dust generated by construction activities within the sites indirect zone of effect;
- 3- Indirect and cumulative destruction by the development activities, for example, the threats introduced by the expansion of agricultural and urban areas;
- 4- Looting of archaeological sites and remains by scavengers, mainly looting cemeteries;
- 5- Unrecognized natural affecters;
- 6- Limited maintenance, rehabilitation and restoration projects of the discovered (excavated) sites, and many archaeological and cultural sites require more attention;
- 7- Lost conservation opportunities of the undiscovered (excavated) sites.
- 8- Limited protection of archaeological sites; and
- 9- Lack of local communities awareness and involvement in sites management.

4.3 Recommended Conservation Measures

The drafted Jordanian Temporary Antiquities Law No. (23) of 2003, the Antiquities Law No. (21) of 1988 and the Regulations of Archaeological Excavation and Surveys provide the basis for the conservation of archaeological sites in Jordan (see **Annex 3**). The recommendations and conservation measures for existing and possible threats to archaeological sites have been formulated to comply with the above-mentioned laws and regulation.

In general, the suggested conservation measures are basic requirements for sustaining for future generations while developing economic opportunities. On the other hand, elaborated assessment of each site has to be conducted, and adequate protection, maintenance, restoration and rehabilitation project should be identified and implemented whenever necessary. The suggested conservation measures are general for conservation of archaeological and cultural heritage resources all over the Valley. The conservation of each individual site might include one or more of the following:

- Improve the identification and assessment of all archaeological sites. In addition to the regular excavation activities, elaborated site assessment should be carried out to identify the significance and rarity of the site, the site direct and indirect zones of effect, and the buffer zone (exclusion areas) required by each site;
- Cultural Resources Management (CRM) implementation in addition to coordination of responsibilities with CRM monitoring groups including the Department of Antiquities / Ministry of Tourism, and the Ministry of Religious Affairs. CRM include site maintenance, restoration and rehabilitation, and deals with both man-made and naturally-occurring effects;
- Enforce antiquities laws and regulations, and improve the existing site protection practices especially against the looting activities;
- Establish archaeological and cultural heritage reserves for the proposed reserves and other highly significant sites;
- Sites located within the existing nature reserves are considered protected from man-made impacts, however, additional maintenance and CRM activities might be necessary and have to be carried out in coordination with all related authorities including the DOA and the RSCN;
- Enforce the prerequisite of conducting impact assessment to archaeological and cultural heritage resources as part of Environmental Impact Assessment (EIA) studies for any proposed developmental projects;
- Enforce the implementation of the recommendations made by the archaeological assessment study and charge the contractors and project owner penalties for non-compliance;
- Shifting the development activities (construction, quarries, dams, roads, agriculture activities, urban activities,...etc.) for a distance that is enough as to protect the site whenever the site is significant and require this shifting. Otherwise other economically and conservation sound measures should be applied;
- Following “Chance-find” Procedures;
- Adopting special procedures in the vicinity of sites defined as requiring protection. These include protecting the site by fencing, conducting site rescue excavation, conducting site restoration, and implementing signage system to the site;
- Apply regular monitoring and inspection activities to excavated, under excavation and chance-find sites, and apply audit activities to the ongoing construction or developmental activities anticipated to impact archaeological sites;
- Implement signage system for all archaeological and cultural heritage sites including the site management regulations;
- Implement well-planned and adequate public awareness programs concerning the conservation of archaeological sites;
- Enhance the involvement of local communities in the management of at least the major archaeological and cultural heritage sites. Side by side, it might be attractive to develop alternative business opportunities relevant to the target site for the local communities benefiting similar experience gained from the conservation of nature sites like Dana, thereto, promote conservation within local communities and gain their support for the conservation efforts;

- Develop suitable tourism linkages to link related sites together and properly marketing these linkages would attract more visitors and thus promote the publicity of these sites. This would gain these sites more conservation attention at the governmental, nongovernmental and local levels.

In general, for projects entering the construction stage, three points could be added to contract documents, which would be beneficial for the protection of archaeological sites:

1- Borrow Areas:

The locations of borrow areas and quarry sites selected by the contractor should be approved by the Department of Antiquities to prevent antiquities being damaged by quarrying or borrow excavation. Such inspection should not be unreasonably delayed.

2- Observation of Construction Excavation:

In areas where the Department of Antiquities knows or suspects the existence of remains under the surface, but where there is insufficient time for archaeological excavation (or the importance of the site does not warrant full scale investigation prior to construction), a representative of Department of Antiquities should be present during the opening of any excavation or borrow pit to identify and record any archaeological remains found.

3- Additional Salvage Excavation:

In areas where the Department of Antiquities has determined that further salvage excavation will be necessary, based on the information developed during the Final Design phase, salvage excavation will be carried out at the beginning of the construction phase. Construction activities should be scheduled so as to leave any such area until late in the construction process, and thus construction activities would not be delayed by the archaeological excavation.

4- Archaeological Chance Find and Salvage Excavation:

It shall be the responsibility of the Contractor to obtain all information available from the Supervisor of the Cultural Resources Management Office of the Department of Antiquities regarding the location of any known archaeological site in the construction area, and he shall make this information available to the Engineer's Representative as soon as he obtains it. If any known sites will be threatened by construction, agreement must be reached with the Department of Antiquities in order to minimize damages to the site. It shall also be the Contractor's responsibility to notify the supervisor of the Cultural resources Management Office of the Department of Antiquities if antiquities are encountered in any area during construction, and the specifications set in articles 15 of the antiquities Law No. 21 of 1988 (**Annex 3**).

If any site found during construction and will be damaged by construction activities, the Department of Antiquities will assess the discovered remains and will carry out an emergency salvage excavation. Salvage excavation means archaeological excavation conducted during construction phase. It should be conducted only when an archaeological site is found by accident (chance find) during construction. Given the short time available for a salvage excavation, this type of work should be avoided.

The available short time for salvage excavations cannot be considered an authorization to destroy the discovered remains or site, since each site must be given proper consideration and analysis before its destruction can be authorized.

The cost of the further salvage excavation will be included in the bill of Quantities as a provisional sum.

The contractor shall seek the written approval of the Department of Antiquities before the removal of any chance find building, foundation, structure, fence and other obstruction over 50 years old, any portion of which is in the construction zone. All designated salvageable material shall be removed, without causing unnecessary damage, and in sections or pieces which may be readily transported, and shall be stored by the contractor at approved locations for later use or possession of the Department of Antiquities. The contractor should also note that the chance find procedure covers graveyards and individual burial sites.

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Annexes

Annex 1

The Block B Grant Proposal

Annex 1: The Block B Grant Proposal

GLOBAL ENVIRONMENT FACILITY PROPOSAL FOR PROJECT DEVELOPMENT FUNDS (PDF) BLOCK B GRANT

6 COUNTRY	JORDAN
GEF Focal Area	Biodiversity
Operational Programmes	1. Arid and semi-arid ecosystems 2. Wetlands 4. Mountain ecosystems 12. Integrated Ecosystem Management
Project Title	Integrated Ecosystem Management in the Jordan Rift Valley
Requesting Agency	The World Bank
Estimated Total Project Cost	US\$ 66.55
Estimated Financing plan	US\$ 12.0 GEF US\$ 25.0 (IRBD - associated Rift Valley Improvement Project) US\$ 25.0 (Others –associated Rift Valley Improvement Project) US\$ 2.55 (Government of Jordan) US\$ 1.0 (Royal Society for the Conservation of Nature) US\$ 1.0 (Private sector)
Project Duration	6 years
Preparation Costs	US\$
PDF Block B Funds Requested	US\$ 300,000
PDF Co financing (in kind)	US\$ 100,000
Block A Awarded	No

1. Project Objectives and Summary

The main objective of the 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. It will provide a large-scale pilot programme for introducing the principles and practice of integrated ecological management throughout a productive landscape and thus a potential global model.

The principal outputs would be:

- Established network of eight protected areas in the Rift Valley, with implemented management programmes, safeguarding key habitats and important bird areas.
- Viable nature-based business enterprises developed for local communities living in and around the designated protected areas.
- Conservation orientated land use plan for ecologically strategic areas of the rift valley corridor prepared, ratified and enforced.
- Effective institutional and operational systems, involving all partners (Section 7), in place for the enforcement of all environmental laws and regulations governing infrastructure and building development, industrial processes and other land uses within the rift valley corridor.

- Agricultural extension service developed and available to all farmers, promoting environmentally sound land use practices, including integrated pest management and low water consumption technology.
- Established demonstration projects promoting sustainable agriculture and alternative livelihoods.
- New and improved facilities constructed and operational systems developed for the treatment and reuse of wastewater from urban, agricultural and industrial sources through the associated proposed Rift Valley Improvement Project.

The Jordan Rift Valley is part of the Great Rift Valley, one of the World's largest geophysical features and a globally important ecological corridor linking widely different ecosystems across two continents. The Jordan section is a particularly vital component, since it provides a land bridge between Africa, Europe and Asia that funnels millions of migrating birds between the continents each year. These birds rely on the Jordan Rift Valley for navigation and feeding and resting sites. The Jordan Rift Valley also contains ecosystems of international and regional value, including the Dead Sea, Gulf of Aqaba and Jordan River and supports many endangered and endemic species. The Dead Sea itself is the lowest and most saline body on Earth and a recognized 'biodiversity hotspot' because of the high level of endemism in the area. The ecological integrity of the Rift Valley is threatened by infrastructure development, urban and industrial expansion, intensification of agriculture, unregulated hunting and expanding tourism ; development pressures that are accelerating as Jordan strives to counteract its serious economic problems.

The proposed project is a comprehensive programme that responds to new strategic shifts in the GEF by embracing measures to promote integrated ecosystem management in the context of a total landscape and to build on national policy, legislative and planning instruments that will mainstream biodiversity conservation into land use and development programmes. It will build on the lessons learned from previous successful GEF initiatives, including the Dana Project, and presents a special opportunity for a large scale pilot scheme in integrated ecosystem management that could become a world model.

As the project has several major components, crossing different environmental sectors and involves government and non-government agencies in implementation, a PDF Block B grant is essential to prepare the groundwork thoroughly and ensure that strategies, outputs, activities, institutional arrangements and financial requirements are clearly defined and the project as a whole is potentially viable. The government agencies and environmental institutions in Jordan do not have adequate funds or technical expertise to prepare a full project document without assistance.

2. Project Context and Global Significance

6.1 Country Background

Jordan is a small country of 90,000 square kilometres, with a population of about 4.7 million. It has a remarkably varied topography, geological structure and climatic regime. The country topography consists of three main features: Jordan Rift Valley with the Dead Sea basin, the forest-covered northern highlands and the Eastern Desert. This variation in topography and climatic regime have led to the formation of an equally varied range of ecosystems, from evergreen oak forest to sand dune desert. Arid and semi-arid ecosystems are particularly fragile and habitat degradation and species losses in Jordan have been severe. Seven large mammals and at least ten plant species are known to have become extinct in the last ninety years and it is estimated that about one million hectares of rangeland have deteriorated into marginal steppe (NEAP Working Paper 1995). Previous GEF activities in the country have revealed the presence of many globally threatened species, including several endemics. The persistent causes of such degradation and loss are deforestation, overgrazing,

inappropriate agriculture, urbanization and population growth. The growth in mass tourism has also been cited as a 'new' threat to environmental quality (NEAP working Paper 1995).

6.1.1 The Global Significance of the Jordan Rift Valley

The Jordan Rift Valley is part of the Great Rift Valley, the enormous fault line in the Earth's surface that stretches 5000 kilometers between Turkey and East Africa. In Jordan, it cuts across the western edge of the Kingdom for 370 kilometers, from Yarmouk in the north to the Gulf of Aqaba in the south, creating a scenically spectacular corridor linking five neighbours: Egypt, Israel, Jordan, the West Bank and Syria. The Jordan river basin is also contained within the Jordan Rift Valley; a multinational river, flowing southwards for a total length of about 230 km through Lebanon, Syria, Israel, West Bank and Jordan into the Dead Sea. The Yarmouk River, originating in Syria, flows for about 40 km along the Syria-Jordan and then Jordan-Israel borders before joining the Jordan River about 10 km downstream of Lake Tiberias. Up to Lake Tiberias and above the Lake, water is of relatively better quality; further downstream, water is polluted by irrigation return flows, and untreated wastewater discharges. Natural saline springs also flow into the river.

The Great Rift Valley is a globally important ecological corridor and the Jordanian section represents a strategically crucial component, since it provides the "ecological land bridge" between Africa and northern Europe that funnels millions of migrating birds each year between the two continents. The sharp physical boundaries of the Jordan Rift Valley, clearly visible from the air, provide a navigational guiding system for these birds and the habitats it contains provide vital resting and refueling stations, without which they are unable to complete their long journeys.

Apart from its significance for birds, the Jordan Rift Valley also holds many large and internationally important ecosystems, including desert, mountains, wetlands, sea and forest; e.g. the Dead Sea, the Gulf of Aqaba and the Jordan and Yarmouk river systems, as well as numerous specialised habitats of regional importance such as the Yarmouk forest. The Dead Sea itself is the lowest and most saline water body on Earth and is noted as one of the World's "biodiversity hot spots" because its extremely harsh environment has engendered a high level of endemism.

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 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).

Regional Aspects. Annex II of the 1994 Treaty of Peace between Israel and Jordan includes uses of the water resources of the Jordan and Yarmouk rivers between the 2 countries. The Multilateral Working Group on Water of the Middle East Peace Process has produced water resources management studies and provided training to Israel, Jordan and the West Bank and Gaza. Also, the Multilateral Working Group on the Environment has undertaken training programmes in environmental legislation and enforcement. A project monitoring bird migration through the Rift Valley using the Internet has also been initiated under MERC (Middle East Regional Cooperation), with separately managed components for Israel, Jordan and the Palestinian Authority. A similarly structured project for promoting bird watching in the region, entitled "Together for Birds and People" is being sponsored by Birdlife International and is currently under consideration for funding by the European Union (EU).

3. Issues, constraints and opportunities affecting biodiversity conservation

6.1.1.1 *Maintenance of ecological integrity:* The Jordan Rift valley is essentially one linear ecological system. It is physically contained by high mountains, forms the catchment 'basin' for several river systems and has its own specialised climatic zones. Its ability to continue functioning as one integrated system, and thus its ability to retain its biodiversity values, depends on maintaining the integrity of key features and processes, such as characteristic and specialised natural habitats, water regimes and mineral and nutrient cycles. A national review of Jordan's protected areas (RSCN 1999) identified 6 key ecosystems in the Rift Valley, representing the spectrum of habitat types along the corridor, but only two of these have any official designation or protection: the Mujib Nature Reserve on the shores of the Dead Sea and the coral reefs in the Gulf of Aqaba. A further 4 Important Birds Areas have been identified by Birdlife International as strategic sites for resident and migratory species and these, likewise, have no official recognition or protection. Whilst the establishment of a backbone of protected areas in the Rift valley is an essential first step to safeguarding its biodiversity interest, the maintenance of ecological integrity along the Rift Valley corridor as a whole demands that conservation-orientated measures are introduced into the rest of the productive landscape. This will not only secure ecological processes but will create a network of linkages between protected areas, assisting their viability and fostering genetic exchange and the continuation of evolutionary processes. At present, there are many threats to the ecological integrity of the Rift Valley system that need to be addressed as part of one unified approach, of which the most pressing are urban and industrial expansion, water extraction and pollution, inappropriate agricultural practices, excessive hunting pressure and unplanned tourism development (see threat analysis, Annex 1).

Absence of conservation-orientated land use and development strategies: The Jordan Rift Valley is strategically important for Jordan's economic development as well as for biodiversity conservation. It is a "ready made" transportation route between north and south, has vital mineral deposits supporting chemical industries, has a large percentage of the country's water supplies and is becoming a key destination for tourism. It is also one of the Kingdom's most productive agricultural areas. With such a key economic role and many development pressures, there is a need to have clear land use and development strategies that acknowledge both its development potential and its ecological importance. There has been a number of land use planning initiatives in recent years but there has been little coordination between them and few have recognized the value of the Rift Valley as a single ecological feature. The exception was the 'Development Plan for the Jordan Rift Valley', prepared in 1997 by The Jordan Valley Authority, as part of a World Bank assisted multilateral initiative. This plan acknowledges the environmental significance of the Valley and proposes a number of projects. However, its recommendations were largely site specific and it did not detail ways of integrating nature conservation into broader land use strategies throughout the length of the Rift corridor. A more recent conservation-orientated initiative has been the attempt by Friends of the Earth Middle East (FOME), under the umbrella of UNESCO, to spearhead the preparation of a development plan for the Dead Sea Basin, in the context of an international Biosphere Reserve. This initiative is currently suspended because of the political crisis in the region. The Jordan Government itself is working on a national land use plan and the Royal Society for the Conservation of Nature (RSCN) has submitted suggestions for including strategic wildlife sites in the Rift Valley for consideration. However, none of the planning initiatives described are close to producing policies, guidelines and regulations that can be implemented and enforced or incorporate the need for ecological parameters, and there is little coordination between the various organisations working on them.

Inappropriate agricultural practices: The northern part of the Jordan Rift Valley is a major producer of fruit and vegetables, most of which consume high volumes of water, such as bananas, melons and tomatoes. They are heavily irrigated, using water from the Jordan River, and are one of the reasons for Jordan's acute water deficit. Pest control is also a problem and the farms are renowned for using large

amounts of pesticides. Apart from the risks to human health, the over consumption of water and heavy use of chemicals is a threat to ecological systems and needs to be addressed. The current preference for water demanding crops is also creating demands for water extraction schemes in the south of the rift, which is extremely arid. The Mujib Nature Reserve was the subject of one such scheme, in which a large proportion of the water from the River Mujib was earmarked for growing crops like tomatoes and melons. The government has been increasing its control of water consumption but there is a need to promote alternative, less water demanding crops and integrated pest management schemes, as well as other conservation-orientated farming methods.

A lack of alternative and community-based approaches to economic development: Many of the environmental problems of the Rift Valley stem from the over consumption or degradation of natural resources caused by conventional, exploitative economic uses, such as chemically dependent agriculture and mineral extraction. There are also increasing problems from the growing population of subsistence and nomadic tribal communities, who are finding it more difficult to support themselves on arid, marginal land because development and political issues restrict them to smaller areas and inhibit their nomadic lifestyles. It is these communities that are largely responsible for overgrazing rangelands and illegal woodcutting. There is, therefore, a need to develop alternative livelihoods for many communities in the Rift Valley that are more sustainable and engender a more caring approach to the protection of biodiversity. The Dana GEF project (1994-1999) demonstrated that it was possible to build community based economic enterprises around the sustainable use of protected areas and naturally occurring products. The Rift Valley itself has a wealth of beautiful areas and several existing and potential protected areas and these could stimulate a diversification of the economy, especially through nature-based tourism. The Dana experiment has verified that a significant international and in-country market exists for such tourism, and the Rift valley has the added bonus of large numbers of migrating birds. There is great potential for exploiting the “wilderness experience” and bird watching tourism markets, which are substantial and lucrative. There are also opportunities for pioneering alternative agricultural ventures, utilizing low water consumption crops and organic techniques, since there is a growing market for ‘chemical free’ food products in the larger urban centres of Jordan.

Legal and Institutional framework: Laws supporting development control and the regulation of solid and hazardous wastes, pollution and hunting have been strengthened in recent years as a result of the enactment of the Environmental law of 1994. While there are still major weaknesses with this Law, the main issue at present is not with the adequacy of laws and regulations but with their enforcement. Financial constraints and a lack of equipment, trained personnel and general awareness are inhibiting the consistent application and enforcement of environmental laws within the Rift Valley and throughout Jordan.

There are several agencies involved in environmental regulation and management in the Rift valley, of which the Jordan Valley Authority is the most significant, since, technically, it has jurisdiction over all aspects of development control on land below 300 meters in altitude. Other important players are the Ministry of Agriculture, the Aqaba Special Economic Zone Authority (ASEZA) and the Royal Society for the Conservation of Nature (RSCN). The RSCN is the most involved in biodiversity conservation and has a mandate to manage the Mujib and Dana Nature Reserves, which occupy the scarp slopes of the rift valley mountains, and also to enforce the hunting control laws. Excessive hunting is a major problem in the Rift Valley and RSCN employs a small team of rangers to patrol the valley and apprehend illegal hunters. There is no clear mechanism for coordination between these agencies and no bonus upon them to act collectively, within the framework of an integrated conservation and development strategy for the Rift Valley as a whole.

4. Project linkages to national priorities, action plans and programmes and lessons learned

National Priorities. The Jordan Rift Valley was highlighted as an area of exceptional ecological value in the Biodiversity Country Study (BCS), published this year (2000), and the study makes several key recommendations for the Valley, including a network of protected areas, strengthening the land use and enforcement systems, monitoring agricultural practices and developing socio-economic

projects. Jordan is currently taking the final initiation activities to start the preparation of the Biodiversity Strategy and Action Plan (BSAP). The Jordan Government has also endorsed a national network of protected areas and the designation of all sites proposed for this network was declared a priority in the National Environment Strategy (1992) and the National Environment Action Plan (1995). To date, 6 out of the 12 proposed protected areas have been established. A full review of the network was carried out as part of the GEF Dana Consolidation Phase (1998) and this recommended the addition of 5 new protected areas along the Rift Valley (see annex 1). Bird Life International has also identified a total of 9 Important Bird Areas and these are acknowledged in the BCS. Further acknowledgement of the Rift Valley's ecological value is given in the "Development Plan for the Jordan Rift Valley" (1998) produced by the Jordan Valley Authority.

6.1.1.2

6.1.1.3 Project linkage to World Bank programmes and other initiatives. The proposed project is in line with the Country Assistance Strategy (CAS) for Jordan especially in addressing the environmental issues of land degradation and desertification, industrial pollution, and threats to natural and cultural heritage. The project is associated to the proposed Jordan Rift Valley Improvement Project that focuses on improved water management (see component E). The project strongly complements several ongoing and planned Bank projects, and other donor interventions. Among these are: a) the ongoing Jordan-Gulf of Aqaba program which has a GEF component, b) the PERSGA GEF program for the conservation of the Red Sea, and c) the GEF project "Conservation of Medicinal and Herbal Plants", for which the PDF is under implementation. The Gulf of Aqaba and Red Sea initiatives are particularly apposite, since both of these marine areas occupy part of the Rift Valley. The proposed project will strongly build on the experience of the GEF Dana Project of integrating conservation with community development, especially in income-generating activities with local communities. There are embryo private sector initiatives in date farming, tourism and the management of IBA wetlands within the Jordan Rift Valley that could be dovetailed into the Community Driven Development component (see component B). Links with other initiatives will be developed at the PDF stage.

Lessons learned from previous GEF and IRBD projects.

The project would benefit from 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 (RSCN) 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. The lessons learned from the Dana project are further detailed in Annex 2.

5. Project Description

The proposed project components are summarized in the following table, together with indicative costs

Component	Category	Indicative cost (US\$M) (of which GEF)	% of total
<p>A. Protected area establishment and Management</p> <ul style="list-style-type: none"> 4 new protected areas for key habitats and ecosystems with implemented management plans. Improved management of existing protected areas. Protective measures for 4 Important Bird Areas 	Surveys, physical works, equipment, capacity building	7.25 (5.5)	11.0%
<p>B. Community driven development</p> <ul style="list-style-type: none"> Development of nature-based socio-economic programmes based around protected areas Demonstration projects for sustainable agriculture and other alternative livelihoods 	Surveys, physical works, equipment, participatory approaches, business development, promotion	4.95 (3.5)	7.5%
<p>C. Development of conservation orientated land-use planning initiatives</p>	Surveys, planning, participatory approaches, legal and regulatory, capacity building	1.2 (.75)	1.8%
<p><i>D. Institution and capacity building</i></p> <ul style="list-style-type: none"> Improved enforcement of environmental laws and regulations Awareness and extension programmes Training and institutional development programme 	Equipment, legal and regulatory, capacity building, media	3.15 (2.25)	4.7%
<p><i>E. Water management improvement</i></p> <ul style="list-style-type: none"> Water management including reuse of treated water and enhancement of environmental protection components of the associated proposed Jordan IBRD Rift Valley Improvement Project 	Physical works, capacity building	50 (IBRD 25 Others 25)	75%
6.1.1.4 Total		66.55 (12.0)	

6.1.1.5

6.1.1.6 Description of the components

Component A: Protected Area Establishment and Management

Three major initiatives are included under this component:

(i) The establishment of four new protected areas along the rift valley corridor, representing the key ecosystems and habitats identified in the protected area review (RSCN 1999). These areas are the Yarmouk River Valley, a wooded river valley in the north and tributary of the Jordan River; the Jordan River near the Baptism Site, in the central area of the Rift; the sub-tropical palm community at Fifa, south of the Dead Sea; and the mudflats at Quatar in the far south, close to the Gulf of Aqaba (see Maps in Annex 3). The program will include baseline ecological surveys, boundary identification and marking, preparation of management plans, construction of required infrastructure, including visitor facilities, recruitment and training of protected area management teams, community consultation and involvement mechanisms and the introduction of on-site management and environmental monitoring systems. Government approval to proceed with the establishment of the protected areas will be secured during the PDF-B phase and baseline activities will start in project year 1. Official declaration of the sites is likely to take place in years 2 and 3.

(ii) Support for the development of the Mujib Nature Reserve, a strategically important protected area on the edge of the Dead Sea, established in 1987. This reserve holds many special habitats and most notably a large section of the Mujib River, the last semi-wild, unpolluted river in Jordan and a major water source for the Dead Sea. Over the last 2 years, the reserve has experienced enormous visitor pressure as a result of intensive hotel development along the shores of the Dead Sea. The project would enable the development of key visitor facilities, including a visitor centre, campsite and high-level boardwalks into the Mujib River Gorge. These would help to ensure that visitor pressure is kept within carrying capacities and provide the stimulus for community-driven business enterprises, as well as generating income to support the running costs of the protected area. Other priorities are the development of staff capacity, especially in tourism management, and on-site monitoring systems, especially for the Mujib River and its tributaries, which are threatened by extraction schemes and inappropriate agriculture in the catchment.

(iii) The development of protection mechanisms for four Important Bird Areas (Annex 3): Swimeh, at the southern end of the Jordan Valley, Ghor Safi, south of the Dead Sea, Wadi Bin Hammad, on the Rift Valley scarp, south of Karak, and the central area of Wadi Araba (the other 5 IBAs in the Rift Valley are included within existing or proposed protected areas). These sites will not be established as conventional protected areas, with full infrastructure and permanent management teams. Instead, the programme will achieve protection through development of local planning policies and regulations and through community involvement, whereby the required management activities will be carried out by local people working in partnership with appropriate NGOs or government agencies. The project will facilitate this approach through capacity building programmes, the development of a community ranger service, introduction of monitoring systems and the provision of essential basic infrastructure and equipment.

Component B: Community Driven Development

This component will examine and develop the potential for creating alternative businesses and livelihoods around the key protected areas in the Rift Valley, as pioneered in the Dana model. It will involve baseline socio-economic surveys, community consultation and participation, identification of prototype products and services, trial marketing of these products and services and the development of “winning ideas” to create viable businesses. Workshop facilities and essential infrastructure will be needed, as well as intensive on-the-job training and long-term marketing programmes. A key element of the approach will be to develop local management structures and business partnerships. Potential

focal areas for such nature-centred business development are tourism (especially bird watching), medicinal plants and alternative, high-value food products.

Demonstration projects will also be established under this component to test and promote alternative land uses. These will be designed to address some of the main threats to the biodiversity value of the Rift valley, such as chemically dependent / water demanding agriculture, woodcutting, overgrazing and hunting. Test sites will be secured through government agencies (which have large areas of land in the Valley) or through agreements with local farmers and other direct users. The trials will be well monitored and the results published, and the sites themselves promoted and open for public access.

Component C: Development of Conservation-orientated Land Use Planning Initiatives

This component will build on current land use initiatives, concentrating on the introduction of specific conservation-orientated proposals that can be adopted and implemented in the short to medium term. It will seek to gain acceptance within the various agencies involved in the Rift Valley of the need to incorporate ecological aspects into planning policies, regulations and development schemes and to stimulate coordination between them in these matters. It will also seek to involve them in pilot schemes in limited areas, where consultation mechanisms and procedures and the practicalities of implementation can be tested. The project will facilitate the process by providing expertise and capacity building, by assisting with surveys and map production and by funding pilot schemes.

Component D: Institution and Capacity Building

Public awareness and extension programmes will be developed under this component, tailored to specific target groups; notably farmers, hunters, municipality staff, developers and decision makers. These programmes will emphasize the ecological and resource value of the Rift Valley and the need for integrated conservation and development in the interests of both environmental protection and economic sustainability. A major extension programme will be developed for farmers to promote the use of low water consumption crops, integrated pest management, water saving technologies and habitat enhancement techniques. The need to improve the enforcement of environmental laws and regulations will also be addressed, through fostering the creation of networks between enforcement agencies (e.g. JVA and Ministry inspectorates, RSCN rangers and the police), the development of Rift Valley enforcement strategies, training programmes and the provision of essential equipment such as radio-links and patrol vehicles.

While capacity building is a feature of all components, there will be a need to further the skills of the key executing agencies, especially in the fields of environmental planning, impact assessment and institutional management so that they can fulfill their supervisory and coordinating roles more effectively. For this reason, a generic capacity building programme has been included in this component.

Component E: Water Management Improvement

This component is part of the associated IBRD Rift Valley Improvement Project and will improve water resources management and especially the collection, treatment and re-use of wastewater. The IBRD loan addresses root causes that would lead to reductions in water withdrawal and improved reuse of treated wastewater. The amount of the treated wastewater available for use is expected to double by 2020.

6. Estimated project costs and financing (million US\$)		
GEF	Project	\$11.70 M
	PDF – B	\$ 0.30 M
	<i>Sub-total</i>	<i>\$12.00M</i>

6.1.1.7 Relevant components of Associated project

6.1.1.8

6.1.1.9	IBRD	\$25M
	Others	\$25M
	<i>Sub-total</i>	<i>\$50 M</i>

Co-financing	Government contributions	\$2.55M
	RSCN contribution in kind	\$1.00M
	Private sector	\$1.00M
	Others (TBD)	TBD

A. Sub-total \$4.55

6.1.1.10 Total project costs \$66.55M

6.1.2 7. Implementation arrangements

The project will be implemented over six years. Implementation arrangements will be discussed during the PDF-B phase. Coordination arrangements required between the key stakeholders could be the object of a development strategy to bring the partners together to act collectively. Primary coordination would be provided by the Royal Society for the Conservation of Nature (RSCN) and the Ministry of Planning, operating in partnership with key government agencies. The key government agencies operating in the region are the Jordan Valley Authority (JVA), the Ministry of Municipalities and Rural Affairs (MMRA), the Ministry of Agriculture (MOA) and the Ministry of Tourism (MOT). They would be involved in, or implementing, project components. A Project Steering Group would be created to ensure consultation and coordination between the partners and the other main stakeholders. Since Jordan is an active member of the IUCN, a representative of the Union would be invited to join the Steering Group to provide an international perspective.

Current Institutional Set-Up for Protected Areas. Institutional responsibility for the establishment and management of protected areas, designated for the purposes of nature conservation, is currently vested in the Royal Society for the Conservation of Nature (RSCN). This authority has been delegated to RSCN for each declared protected area by means of a written edict from the prevailing Cabinet of Ministers since the early 1970s. RSCN also has the legal mandate to implement the hunting control laws and this is part of the Agricultural Law of 1970. One of the main feature of the Dana GEF project was the strengthening and restructuring of RSCN in order to enable RSCN to fulfill its mandate of conservation of protected areas and enforcement of wildlife legislation, as the prime government partner in these areas.

8. Proposed PDF Activities

A PDF Block B grant is required to fund the preparatory activities detailed below. These activities will be conducted by specialist consultants working in conjunction with proposed project partners, notably the Ministry of Planning, the Jordan Valley Authority and the Royal Society for the Conservation of Nature.

- a) A review of all available ecological information concerning the Rift Valley to confirm and/or identify all the key ecological features along the corridor, including proposed protected areas and important bird areas.
- b) Preparation of an Action Plan and Schedule for Protected Areas Designation, including boundaries identification and consultations with relevant agencies. This involves:
 - Finalizing and mapping of the boundaries of the proposed protected areas and important bird areas using information from existing sources, including the Protected Area Review (RSCN

2000) and Important Birds Areas of the Middle East (Birdlife International 1998), supported by field surveys to ‘ground truth’ intended boundary lines. This process will also involve consultation with several government agencies.

- Consultation and negotiation with appropriate government agencies to secure written approval for the designation and establishment of all proposed protected areas and IBAs
- c) Identification of Community Driven Development Activities. This will include:
- Carrying out socio-economic baseline surveys and participatory rural appraisals within the local communities living in and around the proposed protected areas to establish their dependency on these areas and the potential for alternative, sustainable livelihoods to be developed to offset destructive land use practices.
 - Consultation with private sector representatives, especially in the fields of tourism and agriculture, to identify development and collaboration opportunities for pioneering new ventures.
 - Identification of potential demonstration projects and target sites for alternative livelihoods, together with resource requirements, through consultation with relevant stakeholders.
- d) Assessment of all recent land use planning initiatives and development proposals concerning the rift valley to determine their current status and identify a practical and achievable strategy for introducing conservation orientated land use regulations within the ecologically important zones of the rift valley corridor. This activity will require consultation with government agencies and notably the Jordan Valley Authority and with other stakeholders including land owners and users.
- e) Identification of outreach requirements for the project components through consultation with relevant stakeholders, with emphasis on the needs of the proposed agricultural extension services.
- f) A review of the institutional aspects of partners involved. This will include:
- A review of the current institutional arrangements for the enforcement of laws and regulations to identify major weakness and the resources and training requirements to rectify these weaknesses.
 - Negotiations with all project partners and proposed implementing agencies to define the institutional and management structure required for successful implementation of the project, taking into account the necessity of keeping the structure simple, clear and accountable.
- g) Identification of the primary capacity building needs of the project partners as the basis for a long-term vocational training and institutional strengthening programme.
- h) Conducting a stakeholders workshop near the end of the preparatory phase to validate the basic intentions of the project.
- i) Preparation of the Project Document. This includes:
- Preparation of terms of reference for each of the main project components, detailing outputs, activities, implementation arrangements, sustainability mechanisms, indicators and itemized budgets.
 - Preparation of the full project document, pulling together all the findings from the above into a cohesive plan to guide the implementation of the project

9. PDF Block B Outputs

The main outputs of the proposed PDF Block B activities would be:

- 1) Protected areas, IBAs and other key ecological features in the Rift Valley identified, mapped and approved for designation and protection by government.
- 2) Opportunities and requirements for community driven, nature-based economic enterprises identified, viability assessed and strategies devised for their development.
- 3) Potential demonstration projects for alternative livelihoods designed and a programme for their execution devised.
- 4) Outline strategy prepared for introducing conservation orientated land use planning regulations into the rift valley corridor.
- 5) Capacity building and outreach requirements for all project components identified and outline institutional strengthening and training programme devised.
- 6) Simple and workable institutional arrangements for effective project implementation and coordination defined and approved by all project partners.
- 7) Detailed terms of reference drawn up for all project components, with itemized budgets.
- 8) Completed project document.

10. Rationale for GEF financing

Jordan ratified the Convention on Biological Diversity (CBD) in 1993 and this project meets the requirements and philosophy of the Convention under the following articles:

- In-situ conservation of ecosystems and habitats
- Sustainable use of biological diversity
- Involvement of local communities
- Capacity building

The project is in line with GEF operational strategies and with four programme areas: (1) Arid and Semi-Arid Zone Ecosystems, (2) Wetlands, (4) Mountain Ecosystems and (12) Integrated Ecosystem Management.

The target site for the project is a strategically vital component of the Great Rift Valley, one of the World's most striking physical features, renowned for its anthropological and ecological value. It also contains a known "biodiversity hot spot" and centre of endemism and is part of a major migratory flyway for birds. Furthermore, the proposed project responds to new strategic shifts in the GEF by embracing measures to promote integrated ecosystem management in the context of a total landscape and to build on national policy, legislative and planning instruments that will mainstream biodiversity conservation into land use and development programmes.

11. National Level Support

As detailed in section 4, the proposed project of a high national level priority for Jordan and has the support of all the partners involved. The Government of Jordan sent a request/endorsement letter to the World Bank for a PDFB grant for the preparation of the proposed project.

12. Justification for PDF grant financing

Securing the ecological integrity of the Jordan Rift Valley will bring exceptional global benefits to biodiversity conservation, since it is part of a world-renowned, and hot spot, ecological corridor, is strategically vital to bird migration and contains several extraordinary ecosystems, including the unique Dead Sea basin. The proposed project is conceptually strong and clear outputs have been defined through discussions with key stakeholders, including government agencies. There is strong political support for the project and it meets nationally agreed priorities for biodiversity conservation as detailed in Section 4?????. Furthermore, the project breaks new ground by moving away from the "island mentality" of protected areas to a more holistic approach whereby protected areas are integrated into a conservation-orientated land use strategy influencing all of the productive landscape. In this context it parallels new GEF thinking and would provide an excellent test site for the new approach.

In view of the pioneering nature of the project, its ambitious targets and its requirement for cross-sectoral cooperation, a PDF B grant is essential to enable the concept and vision to be turned into an achievable programme that will fulfill the project's primary objective. It will enable clear strategies and priorities to be defined through stakeholder participation, set achievable targets and work plans, establish real costs and potential income, define success indicators, establish workable institutional arrangements for implementation and secure required government approvals for land designations and the development of planning regulations. It will also define capacity building needs to ensure future sustainability

The PDF grant will finance preparation only of those components which are expected to have global benefit. Preparation of components that are expected to generate significant national benefits are being financed with funds from the Government, RSCN, the private sector and others.

13. Estimated budget and timetable for PDF by output

PDF OUTPUTS	PREPARATION COSTS IN \$000			DURATION IN PROJECT MONTHS			
	GEF	GOV	NGO	1	2	3	4
1) Protected areas, IBAs and other key features identified, mapped and approved by for designation and protection by government (Activities a,b)	35	5	10	6.2	X	X	X
2) Opportunities and requirements for community driven, nature-based economic enterprises identified, assessed for viability and strategies devised for their development (Activity c)	90		20		X	X	
3) Potential demonstration projects for alternative livelihoods designed and implementation programme devised (Activity c)	10	10			X	X	
4) Outline strategy prepared for introducing conservation-orientated land use planning regulations into the rift valley corridor (Activity d)	20	5		X	X	X	

5) Capacity building and outreach requirements for all project components identified and outline institutional strengthening and training programmes devised (Activities e, f, g)	80	10	10		X	X	
6) Simple and workable institutional arrangements for effective project implementation and coordination defined and approved by all project partners (Activities f,h)	10	5	5			X	
7) Detailed terms of reference drawn up for all project components with itemized budgets (Activity i)	30	10	10			X	X
8) Completed project document (Activity i)	25						X
TOTALS	300	45	55				

ANNEX 1: ROOT CAUSE ANALYSIS
Main Threats to the Biodiversity Value of the Jordan Rift Valley

Threat	Root Cause	Possible solutions
Fragmentation of habitats	<ul style="list-style-type: none"> • Agricultural encroachment • No applied land use strategies • No guideline policies on conservation with development agencies • Unregulated urban and infrastructure expansion • No clearly mandated management agency 	<ul style="list-style-type: none"> • Network of protected areas • Mandated conservation agency for the Rift Valley • Conservation – orientated land use planning
Inappropriate agricultural development	<ul style="list-style-type: none"> • Lack of comprehensive land use strategy • No conservation-orientated policies or extension services • Weak coordination between farmers and gov't agencies • High water demanding crops 	<ul style="list-style-type: none"> • Land use strategy • Conservation extension service • Awareness programme • Improved enforcement of regulations
Water pollution	<ul style="list-style-type: none"> • Excessive agrochemical use • Inadequate guidelines on use of agrochemicals • Minimal sewage treatment • Inadequate controls on industrial effluent 	<ul style="list-style-type: none"> • Develop guidelines with enforcement. • Improve awareness and extension services
Air pollution	<ul style="list-style-type: none"> • Inadequate controls on industrial emissions 	<ul style="list-style-type: none"> • Improved enforcement of standards and regulations
Solid waste	<ul style="list-style-type: none"> • Lack of treatment infrastructure 	<ul style="list-style-type: none"> • Improve sewage treatment infrastructure
Excessive hunting pressure	<ul style="list-style-type: none"> • Inadequate enforcement of laws • Declining bird populations 	<ul style="list-style-type: none"> • Improved enforcement • Established game reserves
Excessive grazing pressure	<ul style="list-style-type: none"> • Inadequate enforcement of regulations • Lack of grazing land • Limited alternative livelihoods 	<ul style="list-style-type: none"> • Improved enforcement • Development of alternative livelihoods • Improved rangeland management techniques
Tree cutting	<ul style="list-style-type: none"> • Inadequate enforcement of regulations • Limited fuel supplies for subsistence communities • Lack of alternative livelihoods 	<ul style="list-style-type: none"> • Improved enforcement • Development of alternative fuel supplies and livelihoods
Unregulated tourism development	<ul style="list-style-type: none"> • Inadequate planning and enforcement of regulations 	<ul style="list-style-type: none"> • Land use strategy • Diversify tourism operations • Develop nature based tourism enterprises
Over-extraction of water	<ul style="list-style-type: none"> • Lack of coordinated strategy 	<ul style="list-style-type: none"> • Water management

	<p>between government and users</p> <ul style="list-style-type: none">• Weak enforcement of regulations (EIAs)• Lack of water conservation technologies• High water demanding crops• No coordination between supply and demand	<p>strategy for the Rift valley</p> <ul style="list-style-type: none">• Improve enforcement of regulations• Develop pilot Demonstrations of water conservation technologies• Improve awareness and extension services
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Annex 2: Summary of the Dana GEF Project and Lessons Learned*

7 BACKGROUND TO THE PROJECT

The “Conservation of the Dana Wildlands and Institutional Strengthening of RSCN ”, so-called Dana Project was a \$3.3 million ‘pilot phase’ GEF project addressing biodiversity conservation in Jordan. It was initiated in January 1994 and completed in December 1996. It had two development objectives:

- (1) To ensure the conservation of the biological diversity occurring in the Dana Nature Reserve (a newly established protected area in southern Jordan covering 320 square kilometers); and
- (2) To upgrade the scientific and managerial capacity of the Royal Society for the Conservation of Nature (RSCN) so that it will be better able to deal effectively with conservation issues throughout the country.

The project was successful in meeting these objectives within the intended time frame. The only elements where progress was delayed were the income generating activities for the Bedouin communities and quantification of grazing threats. The project had no cost over-run or significant cost saving

Several global benefits were generated. notably: ensuring the conservation of arid land ecosystems and globally threatened species; integrating biodiversity conservation with the socio-economic development of local people; and enhancing the ability of the host country to sustain its own biodiversity conservation programme.

Summary of Key Performance Indicators

BIODIVERSITY CONSERVATION	Start of project situation January 1994	End of project situation December 1996
	No official designation of the Dana Reserve	Prime ministerial letter giving RSCN management rights
	Boundaries of the reserve unmarked	Reserve boundaries marked with stone cairns
	No baseline data on species, habitats or ecological relationships	16 detailed surveys completed, providing baseline data for management plan
	Extreme shortage of experienced field surveyors	23 Jordanian graduates trained in ecological survey and assessment
	Little documented evidence for global significance of Dana Reserve	Global significance confirmed with total of 25 globally threatened or vulnerable spp documented in reserve
	No management plan	Management plan completed prescribing 120 management actions to maintain biodiversity. 40 actions implemented by 1996.
	No mechanism for organised regulation of human activities	Zoning scheme introduced, influencing access, grazing and tourism
	No base, focal point or facilities for on-	1400 sq metre Field Centre

* Extracted from the Final GEF report and Independent Evaluation Report commissioned by the World Bank and UNDP

	site management or ecological research	completed comprising site offices, research centre, visitor centre and craft workshops. \$170,000 of co-financing secured to complete building complex.
	No monitoring of environmental change	Monitoring systems established for tree regeneration, grazing and visitor impact endangered sp. and water quality
	Uncontrolled access by domestic livestock and severe overgrazing	Grazing plan implemented based zoning scheme and permits
	54 Bedouin families living inside the reserve with 9,000 goats sheep and camels	Same number of families but now aware of grazing zones and using permits. All camels removed. Status quo to be maintained until alternative income generation alternatives established.
	5 rangers working without overall plan or clear direction	...rangers with clear work plan based on management plan and logical patrolling schedule
	Reserve staff with little or no training in conservation management	Appropriate training given to all staff
SOCIO-ECONOMIC	Start of project situation January 1994	End of project situation December 1996
	Dana village community receiving no economic benefits from reserve (population	3 small businesses established \$52,575 generated from sales 10 people with full time jobs 27 people with part time jobs 73 people received additional income 8 .sales outlets established \$47,930 earned by the community anticipated break even point, 199?
	250-acre terraced gardens surrounding Dana Village neglected and largely unused	significant restoration of terraces and production re-established. Dried fruit and herb enterprise established. 2-fold increase in production over 2 seasons. No of farmers involved increased from 15 in 1995 to 54 in 1996
	No suitable facilities for craft production or food processing in vicinity of reserve	two large and well equipped workshops established in Dana Centre
	No sales outlet for products in Dana Village	Shops established in Dana Centre and main reserve entrance. Turnover represents 18 % of total sales.
	Local communities largely hostile to the reserve and RSCN	Significant attitude shift. Support increasingly voiced and demonstrated.

TOURISM DEVELOPMENT	Start of project situation January 1994	End of project situation December 1996
	No overall strategy for tourism development	Tourism development plan produced based on eco-tourism principles

	No regulation of visitor numbers or Activities	Daily use limits set and a range of organised activities provided (eg guided walks). Codes of behavior introduced
	Cars allowed into conservation zone	Shuttle bus system introduced. Access by cars prevented
	Few tourist facilities and services (1 campsite)	Many facilities provided - designed to limit impact. Include reception points, bus and car parks, visitor centre, guest house, hiking trails, interpretive guides.
	3 local people employed in tourism activity (campsite)	14 local people employed
	Total number of visitors	Total number of visitors
	Income received from tourists \$8857, 8% of reserve costs	Income received from tourists \$51,420, 30% of reserve costs
	No independent attempt to capitalise on tourism by local communities	Two small hotels established in Dana Village serving back packing market
INSTITUTIONAL STRENGTHENING	Start of project situation January 1994	End of project situation December 1996
	RSCN lacking clear mission or objectives	Mission and objectives formulated by staff and Board of Directors
	Internal organisation of RSCN did not reflect main activities	6 Sections created to reflect key functions
	No middle managers	Section Heads appointed to each Section
	Little delegation of responsibility	Responsibility delegated throughout organisation. Section Heads made responsible for staff, work programme and budgets
	No clear management system in operation	System based on 'management by objective' fully operational
	Little forward planning	3-year corporate plan produced jointly by staff and Board. Sectional work plans with targets in place. Weekly planning meetings for all staff. All plans reviewed and monitored as part of established planning cycle.
	Priorities not clear	Priorities established and enshrined in corporate plan
	No computerisation	All sections computerised, including computerised accounts
	Skill base and experience of staff under -developed and inadequate to meet RSCN's national role	Skill base and experience greatly enhanced. Intensive training programme completed covering a wide variety of needs, as identified in training needs analysis
	Relatively low media profile	High media profile
	Fund-raising capacity limited to Board Members	Fund raising and public relations section created with full-time staff.
	No mechanism for generating core revenue	Trust Fund established. \$1.5 dollars secured

	Membership base small and largely inactive	Major recruitment campaign prepared using high profile TV ads. To be screened in Feb 1997
	Schools awareness programme narrowly focused, not interactive and labour intensive	Programme revitalised with latest environmental education techniques. Networking system with school teachers fully operational. Conservation Club numbers increased from 320 to 600, representing 20,000 students
	Awareness programmes concentrating on school students	Programme diversified to include women's sector and decision makers.

INDEPENDENT EVALUATION

An independent evaluation of the project was undertaken during May and June of 1996 by an international team selected by UNDP and World Bank consisting of specialists in arid land conservation and institutional strengthening. Overall, the evaluation was very favourable and strongly supported an extension to the project. A summary of the evaluators key findings and recommendations are presented below:

‘The project has been successful in implementing most of the institutional strengthening aspects it set out to achieve. The end result is an organisation which is accountable, efficient and well focused in meeting its mandate. Institutional strengthening has supported infrastructural development at headquarters and at the reserve level, in providing the latest in office equipment and technology, and has strongly supported human resource development through an active training and recruitment programme. The operating procedures and policies of the organisation are now of a highly professional nature.’

‘Institutional strengthening of RSCN has been extended to great effect to the Dana Wildlife Reserve and, increasingly, to a number of other protected areas in the country. The activities of the various Sections within RSCN have supported the efforts at site level, and the extension of procedures and the working ethos of the organisation to Dana is beginning to yield tangible socio-economic benefits. Through proper long-term management, Dana could indeed become a fully self-sufficient model, integrating conservation and sustainable development aspects.’

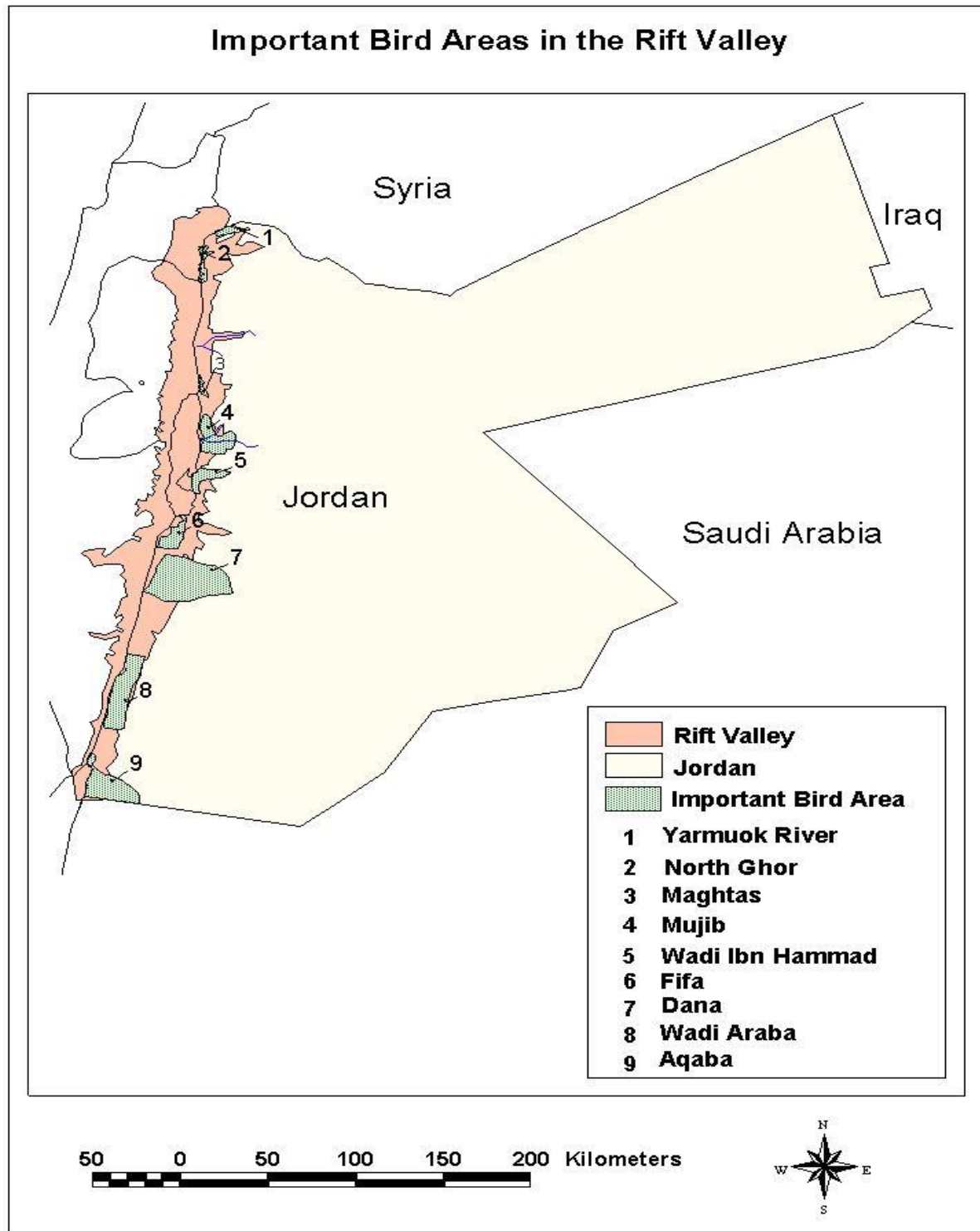
‘ A number of recommendations are made by the team.’

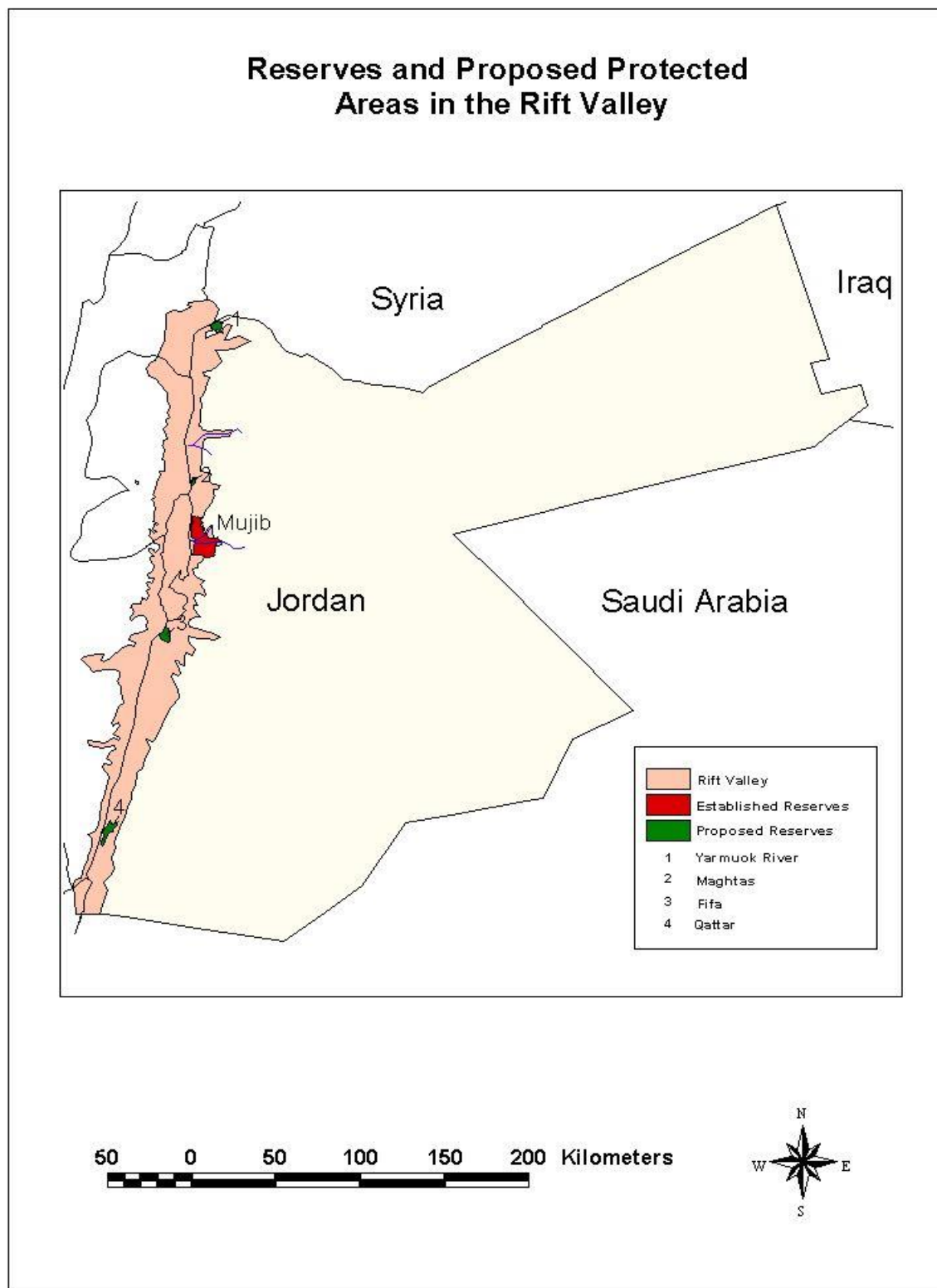
- (i) In order to meet the growing regional threat of unsustainable developments which has been brought on by the signing of the Peace Accord with Israel in September 1994, it is recommended that RSCN should make provision for the legal establishment of a buffer zone around the reserve. It will be important for the future conservation of in Dana that incompatible land uses are controlled and sustainable socio-economic initiatives are assisted within this buffer zone. In particular, it will be necessary to limit the development of mass tourism and to encourage the growth of nature tourism.
- (ii) Management needs to be guided by a better understanding of the ecological processes which underpin Dana unique biodiversity. It is recommended that a scientific committee be established to guide the development of an applied research programme in Dana. Furthermore, it is recommended that a research programme be established to provide data on woodland regeneration and the successional trends in plant and animal communities associated with permanent springs.
- (iii) Reducing flock sizes and strictly controlling livestock movements is a priority for

reserve management. It is recommended that a vigorous outreach programme be initiated to ensure that the Bedouin families can participate in the reserve's conservation programme.

- (iv) Survey reports indicate a possibly high incidence of hunting, baiting, trapping and poisoning in the reserve. It is recommended that the number of rangers be augmented so that the frequency of patrols can be increased and a closer liaison achieved with the local population.
- (v) Extension of the project for a period of 12-18 months would be warranted from an institutional perspective on two accounts: (1) to enable consolidation of progress made thus far, ensuring that the depth and breadth of the organisation, in terms of expertise and staff complement, continues to develop; and (2) enabling RSCN to meet its mandate in the face of rapidly increasing demands and responsibilities, brought through the introduction of new laws and policy, the need to manage steadily increasing tourist demands and development pressures in and around the reserves, and in collaborating with and supporting other agencies in the development of their own institutional capabilities, through training and other initiatives, in support of environmental management. Clearly, however, any expansion in activities of the part of RSCN during a potential project extension would need to be taken in line with the organisation being able to sustain a high level of service and commitment in the foreseeable future.

Annex 3





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Annex 2

FoEME proposed Dead Sea project

(a report entitled: “Let the Dead Sea Live” by FOEME Middle East)

Annex 3

Antiquities Law No. 21 of 1988

Annex 3: Law No.(21) of 1988 The Antiquities Law

Definitions and General Provision

Article 1

This law shall be cited as the Antiquities Law, 1988, And shall come into force from the date of its publication in the Official Gazette.

Article 2

The following words and expressions shall have the meaning hereinafter assigned to them, unless the context otherwise requires:

1. Minister :The Minister of Culture and National Heritage.
2. Department : The Department of Antiquities.
3. Director : The Director General of Antiquities.
4. Antiquity :
 - A- Any object, whether movable or immovable, which has been constructed, shaped, inscribed. Erected, excavated, or otherwise produced or modified, by humankind earlier than the year 1700 A.D. including caves, sculpture, coins, pottery, manuscripts and all sorts of artifact that indicate the rise and development of sciences, art, manufactures, religions, and traditions relating to pervious cultures or any part added thereto, reconstructed or restored at a later date.
 - B- Any object, movable or immovable, as defined in the previous subsection referring to a date subsequent to the year 1700 A.D., which the Minister may declare to be antique by order published in the Official Gazette.
 - C- Human, plant and animal remains going back to a date earlier than year 600 A.D.
5. Archaeological Site:
 - A- Any area in the kingdom which has been held as a historical site in accordance with previous law
 - B- Any other area which the Minister decides contains antiquities, or is associated with important historical events; provided such decision is published in the Official Gazette.
6. Immovable Antiquities: Are the stable antiquities which are connected to the earth, whether constructed thereon or buried therein including those under inland and territorial waters.

7. Movable Antiquities:

Are the antiquities which are disconnected and can be displaced without damaging it or damaging the antiquities linked therewith or the place where was discovered.

8. Excavating:

Is the act of digging, exploring, and investigating with the aim of finding movable or immovable antiquities. Accidental finding of antiquities does not constitute excavation.

9. Dealer:

Any person, whether natural or legal, who trades with antiquities.

10. The Season:

A certain period of the year with which it is conditional that excavations should proceed terminate in accordance with the provisions of this law.

Article 3

A. The Department shall assume the following missions and responsibilities :

1. To execute the archaeological policy of the State.
2. To estimate the archaeological value of antiquities and sites and to evaluate the importance of each antiquity.
3. To administer antiquities in the Kingdom, supervise, protect, maintain, record, beautify the vicinities thereof and exhibit them.
4. To propagate archaeological culture and establish archaeological constitutes and museums.
5. To excavate for antiquities in the Kingdom.
6. To assist in the organization of the various museum attached to governmental activities in the Kingdom; including historical, technical and folklore museum.
7. To cooperate with local, Arab and foreign archaeological institutions for the service of national archaeological culture and consciousness; in accordance with the provisions of this law, and the regulations, decisions, and instructions which are issued in accordance there with.

B. The Director may decide that an antiquity is an immovable antiquity, if it is part of an immovable antiquity, or complementary thereto, connected with it, or ornamental to it.

Article 4

- A. The Minister may, upon the recommendation of the Director, and in cooperation with the Department of Lands and Survey, decide on the names and boundaries of archaeological sites. Which are to be registered in the archaeological register for immovable antiquities; including the limitation of servitudes pertaining thereto.
- B. Such decisions shall be notified to all authorities and governmental department concerned and the archaeological sites shall be marked and their relative servitudes shall be recorded and in the registers and maps of the Department of Lands and Survey

Article 5

- A. The Government shall be the sole owner of immovable antiquities and no other authority shall be by any means whatsoever, appropriate these antiquities or raise any defenses against the State by way of right of ownership; prescription or other defenses.
- B. Ownership of any movable antiquities, possession and provisions of this law.
- C. Amateurs shall have the right to own and collect antiquities from outside the Kingdom provided they register them with the Department.
- D. Ownership of the land does not vest its owner with the right to ownership of the antiquities existing thereon and therein, or disposing with it, and does not entitle him to excavate for antiquities therein.
- E. The Government may expropriate or buy any land or antiquity if it is in the interest the Department to expropriate or buy it.
- F. All the archaeological alone, shall be registered in the name of the Treasury / Antiquities. Likewise shall all unregistered archaeological sites which may be expropriated, or purchased, be registered.

Article 6

The Minister shall, upon the recommendation of the Director, publish in the official Gazette a list of the names and boundaries of the archaeological sites in the Kingdom. This list is to be exhibited at the office of the district, region, sub district, or village in which the archaeological site is situated. No land such sites shall be sold let or delegated to any authority without the approval of the Minister.

Article 7

Any person who is in possession of any antique objects shall submit to the department, a list containing the number and other details connected therewith and a short description of each of them.

Article 8

- A. The Department may with the approval of the Minister buy all, or any of the antique objects referred to in the previous article, provided that their prices are an estimated according to the provisions of this law. The remaining antiquities, which have not been bought by the Department, shall remain in the possession of the owner shall have no right to dispose of them by any means whatsoever, except with the approval of the Minister and recommendation of the Director.
- B. Any person may donate to the Department any antiquities objects in his possession, and such shall be preserved by the Department in its museum in the names of the persons who donated them.

Article 9

It is forbidden to destroy, damage, disfigure or cause any harm to antiquities, including causing change in features, disconnecting any part thereof, altering it, sticking advertisements or attaching any plates to them.

Article 10

The Council of Ministers upon recommendation of the Minister shall have the right to lend, exchange or donate antiquities to official, educational, or archaeological institutions and museums provided the Department of Antiquities has similar antiquities.

Article 11

The Director may determine the prices of books, publications, phones, reproductions, or casts which are issued by the Department or which fall under its control or within its scope.

Article 12

The Minister may, upon the recommendation of the Director, exempt any person, institution or organization from all fees or prices provided for in this law.

Article 13

No permit should be granted for any construction project, including buildings and fences, unless a distance of 5-25 meters is left between them and any antiquities against fair compensation.

Article 14

Notwithstanding the provisions of any previous law, it is forbidden for a rectory person, legal or natural, to excavate in any archaeological site; in search of gold or other objects buried therein.

Article 15

- A. Any person, who discovers or finds any antiquity without being granted a license to excavate, or has knowledge of such discovery or finding, must give notice to the Director or the nearest General Security Center within 10 days from the date of the discovery, finding, or having knowledge of it.
- B. The Director may, with the approval of the Minister, grant a reasonable compensation to any person who discovers or finds any antiquity, according to the provisions of this law.

Article 16

- A. Only the Department may excavate for antiquities in the Kingdom, and allow with the approval of the Minister by special permission organizations, committees, scientific societies, and archaeological missions to excavate; according to the provisions of this law, and after ascertaining their abilities and qualifications; provided the excavation is carried out according to conditions set by Director.
- B. Subject to the provisions of item (A) of this article, it is forbidden for any person, whether natural or legal, to excavate for antiquities in any location in the Kingdom, even if it were his own private property.

Article 17

- A. The Department, or any part licensed to excavate, may excavate in government property or any other, on condition that the property is to be restored to the state in which it was before the excavation commenced, and the excavators shall be bound to compensate the owners of these properties for any damage caused to their property as a result thereof, and the Department shall guarantee such compensation and shall be made to stand security for it.
- B. The compensation referred to in the previous subsection of this article, shall be estimated by a committee consisting of three specialized officials, appointed by the Minister upon the recommendation of the Director.

Article 18

The Institution which has been licensed to excavate as well as the committees and missions delegated by them, shall be bound by the excavating instructions issued by the Minister, and shall execute their work according to the arrangements and procedure specified by the said instructions.

Article 19

A. If an organization, licensed to excavate, or designated group delegated by it, violates the instructions issued in accordance with the provision of this law, the Department may, in addition to the procedure determined by the law, stop the excavation immediately until the violation of the regulation is removed. The Minister may upon the recommendation of the Director, cancel the permit.

The director, stops the excavation if he considers that the safety of the excavating mission or normal safety measures so demand.

Article 20

If the excavations do not start within one year from the date of the permit or are stopped during two seasons within two consecutive years without reason; the Minister may, upon the recommendation of the Director, cancel the permit and may grant an excavation permit in the same area to any other organization without violating by so doing, any rights to the first party whose permit is canceled.

Article 21

All antiquities discovered during excavations carried out by any party shall be considered the property of the State. The Minister may grant any licensed, part some of the movable antiquities found in the excavate, in cases where other similar objects are found in the excavation where these were discovered, subject to conditions and obligation imposed by the Minister.

Article 22

The Department may exclusively or in cooperation with any scientific party, excavate in any Arab or foreign country if the Council of Ministers upon the recommendation of the Minister, finds it necessary to do so in the public interest.

Article 23

Trading in antiquities is forbidden in the Kingdom, and all trading licenses are considered canceled with the coming into force of this law.

Article 24

Subject to the provision of article (23) of this law, it is forbidden to export movable antiquities abroad except with the consent of the Department, subject to the approval of the Minister allowing such sale or export.

Article 25

- A. The Department may buy some or all of the antiquities in the possession of the holder thereof, the price of which can be agreed upon with the Minister. If no agreement is reached, the price would be estimated by two experts; one of whom to be appointed by the Department and the other by the owner of the antiquities. If the two experts do not reach an agreement, they then should appoint a third expert as an Umpire.
- B. If the Department refrains from buying the antiquities, the owner may transfer its ownership to other; provided that such transfer takes place with the supervision.

Article 26

A punishment by imprisonment of not less than one year and not more than three years plus a penalty of 200 Dinars shall be imposed on:

- A. Anyone who excavates without obtaining an excavation permit according to the provisions of this law.
- B. Anyone who trades with antiquities.

Article 27

A punishment by imprisonment of not less than two months and not more than two years and penalty of not less than fifty Dinars and not more than two hundred dinars shall be imposed on:

- A. Anyone who fails to submit to the Department a list of the antiquities in his Poisson on the execution of the provisions of this law, or fails to present a record of the antiquities in his possession.
- B. Destroys, damages, disfigures any antiquity, including the changing of its features, or separating a part thereof, or changing its figure or sticking any advertisement thereon, or placing plates thereon, on adding anything to its surface.
- C. Falsifies any antique or attempts to forge it.
- D. Forges an antique or deals with forged antiques without the permission of the Department.
- E. Makes casts, or reproductions, of antiques and makes use of them without the permission of the Department.
- F. Discovers or finds any antique, or has Knowledge of the discovery or the finding thereof without reporting it according to the prevision of this law.
- G. Present any false record, or information, or incorrect documents or vouchers for the purpose of obtaining any license or permit according to the provisions of this law.
- H. Refuses, or detains to deliver to the Department the antiquities which he has discovered or found; whether he is in possession of an excavation license, or not.
- I. Export or deals with any antique contrary to the provisions of this law; including hiding it or smuggling it.

Article 28

In additions to the penalties provided for in articles (26) and (27) of this law:

- 1. Any antiquities shall be confiscated, if the contravention is committed in connection therewith, and they become the property of the Department.
- 2. Any contraction, building, or other things which have been constructed, made or any planted, contrary to the provisions of this law, or any regulation issued thereunder, shall be destroyed and removed at the expense of the offender, including the cost repairing any damage caused to the antiquity.

Article 29

For the purposes of fulfilling the provisions of this law and all regulations issued thereunder, the Director, his assistants, heads of sections, inspectors of antiquities, and the directors of museums in the Department shall be vested with the powers pertaining to prosecutors as provided for in the Code of Criminal Procedure in force.

Article 30

A reasonable pecuniary reward shall be granted to any person who:

- A. Helps in the confiscation of any antique found or in circulation contrary to the provisions of this law, rules, regulations, instructions and decisions, issued thereunder.
- B. Offers information which leads to the discovery of a violation to the provisions of this law, rules, regulations, and instruction, and decisions issued thereunder.

Article 31

A. The rewards provided for in this law shall be granted in the following manner:

- 1. By virtue of a decision by the Director if I does not exceed 100 Dinars, or by virtue of a decision of the Minister, upon the recommendation of the Director, if it exceeds 100 Dinars, but does not exceed 200 Dinars.

2. The reward shall, in all cases, be estimated by the committee provided for in article (17) of this law or by any other committee which the Minister may appoint for the purpose.

Article 32

The Council of Minister may issue any necessary rules for the execution of the provisions of this law including conditions and fees for excavation, and any entry fees to museums and archaeological sites, museum guide permits, and the constitution of councils and advisory committees.

Article

33

The antiquity law No. 26 for the year 1968 is here by repealed as well as any other law or legislation to the extent to which its provisions may be contradictory to this law; provided that regulations, decisions, schedules, and proceeding which were issued or taken under any law previous legislation, shall remain in force until they are amended, repealed, or substituted, according to the provisions of this law.

Law Title: The Antiquities Law, Law No.(21) of 1988

Article no.	Article	Enforced Yes/No
2.1	Minister : The Minister of Culture and National Heritage.	YES
2.2	Department: The Department of Antiquities.	YES
2.3	Director : The Director General of Antiquities.	YES
2.4	Antiquity : A- Any object, whether movable or immovable, which has been constructed, shaped, inscribed. Erected, excavated, or otherwise produced or modified, by humankind earlier than the year 1700 A.D. including caves, sculpture, coins, pottery, manuscripts and all sorts of artifact that indicate the rise and development of sciences, art, manufactures, religions, and traditions relating to pervious cultures or any part added thereto, reconstructed or restored at a later date. B- Any object, movable or immovable, as defined in the previous subsection referring to a date subsequent to the year 1700 A.D., which the Minister may declare to be antique by order published in the Official Gazette. C- Human, plant and animal remains going back to a date earlier than year 600 A.D.	YES
2.5	Archaeological Site: A. Any area in the kingdom which has been held as a historical site in accordance with previous law B. Any other area which the Minister decides contains antiquities, or is associated with important historical events; provided such decision is published in the Official Gazette.	YES
2.6	Immovable Antiquities: Are the stable antiquities which are connected to the earth, whether constructed thereon or buried therein including those under inland and territorial waters.	YES
2.7	Movable Antiquities: Are the antiquities which are disconnected and can be displaced without damaging it or damaging the antiquities linked therewith or the place where was discovered.	YES

Article no.	Article	Enforced Yes/No
3A	<p>The Department shall assume the following missions and responsibilities :</p> <ol style="list-style-type: none"> 1. To execute the archaeological policy of the State. 2. To estimate the archaeological value of antiquities and sites and to evaluate the importance of each antiquity. 3. To administer antiquities in the Kingdom, supervise, protect, maintain, record, beautify the vicinities thereof and exhibit them. 4. To propagate archaeological culture and establish archaeological constitutes and museums. 5. To excavate for antiquities in the Kingdom. 6. To assist in the organization of the various museum attached to governmental activities in the Kingdom; including historical, technical and folklore museum. 7. To cooperate with local, Arab and foreign archaeological institutions for the service of national archaeological culture and consciousness; in accordance with the provisions of this law, and the regulations, decisions, and instructions which are issued in accordance there with. 	YES
3B	<p>The Director may decide that an antiquity is an immovable antiquity, if it is part of an immovable antiquity, or complementary thereto, connected with it, or ornamental to it.</p>	YES
4A	<p>The Minister may, upon the recommendation of the Director, and in cooperation with the Department of Lands and Survey, decide on the names and boundaries of archaeological sites. Which are to be registered in the archaeological register for immovable antiquities; including the limitation of servitudes pertaining thereto.</p>	YES
4B	<p>Such decisions shall be notified to all authorities and governmental department concerned and the archaeological sites shall be marked and their relative servitudes shall be recorded and in the registers and maps of the Department of Lands and Survey.</p>	YES

Article no.	Article	Enforced Yes/No
6	The Minister shall, upon the recommendation of the Director, publish in the official Gazette a list of the names and boundaries of the archaeological sites in the Kingdom. This list is to be exhibited at the office of the district, region, sub district, or village in which the archaeological site is situated. No land such sites shall be sold let or delegated to any authority without the approval of the Minister.	YES
9	It is forbidden to destroy, damage, disfigure or cause any harm to antiquities, including causing change in features, disconnecting any part thereof, altering it, sticking advertisements or attaching any plates to them.	YES
10	The Council of Ministers upon recommendation of the Minister shall have the right to lend, exchange or donate antiquities to official, educational, or archaeological institutions and museums provided the Department of Antiquities has similar antiquities.	YES
13	No permit should be granted for any construction project, including buildings and fences, unless a distance of 5-25 meters is left between them and any antiquities against fair compensation.	YES
15A	Any person, who discovers or finds any antiquity without being granted a license to excavate, or has knowledge of such discovery or finding, must give notice to the Director or the nearest General Security Center within 10 days from the date of the discovery, finding, or having knowledge of it.	YES
15B	The Director may, with the approval of the Minister, grant a reasonable compensation to any person who discovers or finds any antiquity, according to the provisions of this law.	YES

Article no.	Article	Enforced Yes/No
27	A punishment by imprisonment of not less than two months and not more than two years and penalty of not less than fifty Dinars and not more than two hundred dinars shall be imposed on:	YES
27B	Destroys, damages, disfigures any antiquity, including the changing of its features, or separating a part thereof, or changing its figure or sticking any advertisement thereon, or placing plates thereon, on adding anything to its surface.	
27F	Discovers or finds any antique, or has Knowledge of the discovery or the finding thereof without reporting it according to the prevision of this law.	
27H	Refuses, or detains to deliver to the Department the antiquities which he has discovered or found; whether he is in possession of an excavation license, or not.	
28	In additions to the penalties provided for in articles (26) and (27) of this law:	YES
28.1	Any antiquities shall be confiscated, if the contravention is committed in connection therewith, and they become the property of the Department.	
28.2	Any contraction, building, or other things which have been constructed, made or any planted, contrary to the provisions of this law, or any regulation issued thereunder, shall be destroyed and removed at the expense of the offender, including the cost repairing any damage caused to the antiquity.	
29	For the purposes of fulfilling the provisions of this law and all regulations issued thereunder, the Director, his assistants, heads of sections, inspectors of antiquities, and the directors of museums in the Department shall be vested with the powers pertaining to prosecutors as provided for in the Code of Criminal Procedure in force.	YES

Article no.	Article	Enforced Yes/No
32	The Council of Minister may issue any necessary rules for the execution of the provisions of this law including conditions and fees for excavation, and any entry fees to museums and archaeological sites, museum guide permits, and the constitution of councils and advisory committees.	YES
33	The antiquity law No. 26 for the year 1968 is here by repealed as well as any other law or legislation to the extent to which its provisions may be contradictory to this law; provided that regulations, decisions, schedules, and proceeding which were issued or taken under any law previous legislation, shall remain in force until they are amended, repealed, or substituted, according to the provisions of this law.	YES